

ABSOLUTE BINARY PROGRAM NO. 24296-60001
DATE CODE 1627

DIAGNOSTIC CONFIGURATOR

reference manual

For HP 2114, 2115, 2116, 2100, 21MX M-Series and 21MX E-Series
Computer Systems using the HP 24396A through HP 24396F Diag-
nostics on Multimedia or the HP 24998-14002 Diagnostic Library for
the HP 1000 Computer Systems.



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INTRODUCTION

SECTION

I

1-1. GENERAL

This manual describes the operation and use of the Diagnostic Configurator (hereafter called the Configurator), a standalone program loaded into an HP 21MX M-Series, 21MX E-Series, 2100A/S, 2116A/B/C, 2115A, or 2114A/B Computer System* before other diagnostics. The program loads and controls the sequential execution of most of the HP 2100 Series Computer, interface, and peripheral equipment diagnostics, and they in turn reference the Configurator for certain parameters required by the diagnostics.

The Configurator is available on all diagnostic media which include paper tape, HP 7900/7905 Disc, HP 7970B/E Magnetic Tape, and HP 2644/2645 Cartridge Tape.

The six media which carry the diagnostic library are employed to give the user a choice of several input devices. Any one of the diagnostic media listed below carries a special product number which includes the diagnostic library on the specified medium and all associated manuals:

PRODUCT NO.	MEDIUM	COMMENT
24396A	Paper Tape	Basic CPU and memory diagnostics only.
24396B	7900 Disc	
24396C	7905 Disc	All Configurator-compatible diagnostics on any one medium.
24396D	7970B Magnetic Tape	
24396E	7970E Magnetic Tape	
24396F	2644/45 Cartridge Tape	All Configurator-compatible diagnostics on 10 cartridge tapes.

In addition to the 6 products mentioned above which provide all configurator compatible diagnostics on different media a special selection of diagnostics has been created. This selection (part no. 24998-14002) carries only the diagnostics which are compatible with the HP 1000 System. It consists of 5 HP 2645 cartridge tapes, and the appropriate manuals and is supplied with an HP 1000 System.

Two Diagnostic Reference Tables, which are provided in appendix A, list the Diagnostic Serial Numbers (DSN), diagnostic designations, and the associated part numbers for the HP 2100 Series diagnostics and the appropriate manuals used with the Configurator.

Table A-1 lists all the diagnostics available on the 6 media, table A-2 lists the selected diagnostics for the HP 1000 System.

The Configurator furnishes drivers (console, line printer, and diagnostic input) and commonly used utility routines for the diagnostic program. It also sets parameters related to the computer which can be referenced by the executing diagnostic. This allows a diagnostic, in conjunction with the Configurator, to test an HP 2100 Series Computer, an interface board, or a peripheral subsystem connected to the computer.

*Throughout the rest of this manual, the term "2100 Series Computer" will be used as a general reference to any one of the above-mentioned computer systems. When specifically required, the term "21MX" will be used to specify a 21MX M-Series or 21MX E-Series Computer.

The Configurator can be executed in three basic modes: Conversational, Automatic, and Manual. Other features in the Configurator include a Pretest (for the CPU, memory, and basic I/O), Binary Loaders, Paper Tape Dump routine, and the ability to sequentially execute diagnostics (Long Diagnostic). The Pretest is used when the CPU is in question and a check is desired prior to configurations. The Binary Loaders allow the operator to load diagnostics from any standard input device. (See paragraph 1-2d.) The Paper Tape Dump routine is used to dump (to paper tape) an absolute binary copy of the object code currently in memory. Sequential diagnostic execution capabilities are included to allow the operator to execute diagnostics in the Long Diagnostic mode from any one of the specified input devices.

It should be noted that previous diagnostics were coded for a particular computer system such as the diagnostics designed exclusively for the HP 2116 Computers. The Diagnostic Configurator is not compatible with these single computer diagnostics. However, it is possible to use the Teleprinter Driver portion of the Configurator in conjunction with previous diagnostics. Since, during the loading process, such a previous diagnostic will overlay portions of the Configurator, it is necessary to reload the Configurator when it is desired to run a newer type of diagnostic listed in appendix A. Any programs loaded with the Configurator shall not overlay the linkage area except locations 100, 105, 116, and 126 (octal). (See figure 3-2.)

Also included in this manual are the descriptions and procedures for storing the Configurator, diagnostics, and control programs on disc (Disc Initialization) and interconnecting two CPU's (Cross Link). The binary object programs are separated from the Configurator and have their own DSN's. They must be loaded prior to execution. Disc initialization is covered in appendix C, paragraph C-3 and cross link in appendix C, paragraph C-10.

1-2. REQUIRED HARDWARE

The following hardware is required:

- a. An HP 2100 Series Computer with at least 4K of memory. When a computer has more than 4K of memory, the Configurator utility routines and device drivers are relocated to the last page of memory. See paragraphs 1-5 and 2-10c for memory size restrictions. The computer must have the configured basic binary loader (BBL), for the medium on which the Configurator is stored, in the last 64 (decimal) locations in memory. (Refer to appendix E.)
- b. A loading device for the medium on which the Configurator is stored. (Normally this is the same as the diagnostic input device.)
- c. A console device, for operator communication, is optional. If a console is used, the interface must be an HP 12531B/C/D, HP 12880A, HP 12587B, HP 12966A or HP 12968A.
- d. A diagnostic input device. (The device for loading depends upon the medium on which the Configurator/diagnostic(s) are distributed or available.)
 - (1) Paper tape reader: HP 2737A/B, HP 2748A/B, HP 2758A (or teleprinter with paper tape reader).
 - (2) Magnetic tape unit: HP 7970B/E (9-track only, unit 0 only); requires DMA (DCPC).
 - (3) Cartridge disc: HP 7900A or HP 7901A (unit 0, removable platter only); requires DMA (DCPC).

- (4) Cartridge disc: HP 7905A (unit 0, removable platter and upper surface only) or 7920A (unit 0, upper surface only); requires DMA (DCPC). The disc can only be interconnected to those computers specified in the appropriate hardware manuals.
- (5) Cartridge tape: HP 2644A or 2645A Terminal; requires HP 12966A interface (strapped for external baud rate). (Operator must preselect left/right CTU. Refer to Owner's Manual, part no. 02644-90001 or 02645-90001.)
- e. A line printer (optional, only if the diagnostic requires one): HP 2767A, HP 2610A, HP 2614A, HP 2613A, HP 2617, HP 2618A, HP 2607A, HP 2778A, HP 9866A.
- f. A punch device (required for paper tape dump routine only): HP 2753A or HP 2895A.

Note: Throughout the rest of this manual, model numbers may be abbreviated for simplicity (e.g., HP 2737A/B will be simply 2737).

1-3. REQUIRED SOFTWARE

Additional software beyond the diagnostic(s) or control program(s) to be executed is not required by the Configurator. However, the operator should make sure that the diagnostic(s)/control program(s) to be run have been designed to be used with the Configurator. These programs are listed in appendix A.

1-4. TEXT CONVENTIONS USED

All halt codes, select codes, and addresses used in this manual are in octal unless specifically shown otherwise. Whenever the term "Press PRESET" is used in this manual it applies, in case of an HP 2100A/S, that "INTERNAL PRESET" as well as "EXTERNAL PRESET" has to be pressed. Throughout the flowcharts, notes, and text that follow, abbreviations may be used where necessary to conserve space and reduce confusion. The abbreviations used are listed below. (Such abbreviations as BBL, IBL, I/O, etc., are commonplace in HP 2100 Series Computer manuals and are not listed here.)

ABBREVIATION	MEANING
ADDR	Address
A-REG	A-Register
BMDL	Binary Moving Head Disc Loader
B-REG	B-Register
CART. DISC	Cartridge Disc
CR	Carriage Return
CTU	Cartridge Tape Unit
DC	Date Code
DCPC	Dual Channel Port Controller
DIAG	Diagnostic
DMA	Direct Memory Access
DRT	Diagnostic Reference Table
DSN	Diagnostic Serial Number

ENBL	Enable
EOF	End-of-File
EOM	End-of-Message
E-REG	E-Register
FWA	First Word of Available Memory
HLT(S)	Halt or halts
LF	Line Feed
LWA	Last Word of Available Memory
MAG TAPE	Magnetic Tape
MPRT	Memory Protect
M-REG	M-Register
P-REG	P-Register
REV.	Revision
RTE	Real-Time Executive
SC	Select Code
S-REG	Switch Register (or Display Register)
T-REG	T-Register (or Memory Data Register)
WCS	Writable Control Store

1-5. CONFIGURATOR LIMITATIONS

If a diagnostic, which relocates the Configurator to a different area in memory, is executed and then aborted, the restart procedures as outlined in paragraph 2-10 and figure 2-7 cannot be employed. The Configurator has to be reloaded with the binary loader and configured to continue with the execution of other diagnostics.

It is not advisable to utilize a diagnostic input device which has write capabilities (disc, magnetic tape, cartridge tape) if the functional integrity of the hardware is in question.

Due to the fact that the A-, B- and P-Register on the HP 2114A/B computer can only be accessed via the Switch Register, it is mandatory that the A-, B-, P- and S-Registers be addressed in this sequence whenever the Configurator procedure calls for updating or modifying a register. Whenever the A- and/or B-Register are modified, the P- and S-Register contents have to be restored.

On an HP 2115A/B or HP 2116A/B/C Computer, the A-, B- and P-Registers can be modified in any sequence; however, the S-Register must be the last one set.

The minimum memory size required is 4K. If the diagnostic to be executed or dumped on paper tape requires more than 4K, the minimum memory size is determined by the diagnostic and listed in the appropriate Diagnostic Reference Manual and in appendix A of this manual. Table A-1 lists software and manual part numbers of all diagnostics that run under control of the Configurator. If a diagnostic occupies any memory locations in the area N6300 through N6500 and the diagnostic is loaded from a disc, the available memory size is insufficient. (N= 0 for 4K, N= 1 for 8K, N= 2 for 12K, and N= 3 for 16K. If more than 16K are available, this limitation cannot be reached with any diagnostics). See also paragraph 2-10c.

If the Writable Control Store (WCS) accessory is installed, it must be disconnected to run the pretest because it issues an STF instruction to all SC's. The same applies for all I/O related diagnostics which employ a basic I/O test.

If the 12979B Dual-Port I/O Extender is installed and pretest or any I/O related diagnostic is to be run, the extender should be "locked" to the port (either A or B) that the computer running the diagnostic is connected to.

Full system dedications is required during loading and configuring the Configurator. This also applies to all associated components of the diagnostic input device.

OPERATING PROCEDURE

SECTION

II

2-1. OPERATIONAL OVERVIEW

This section describes the procedures for loading the Configurator, executing the Pretest, configuring the Configurator, and loading the diagnostics. The operating procedures are shown in flowcharts with notes where necessary for clarification.

There are three procedures for configuring the program: Conversational, Automatic, and Manual. The Conversational method provides a means of configuring the program from the console with one input from the S-Register and utilizing the parameters calculated by the program. This method is recommended for the user who is not familiar with the Configurator. The Automatic method provides a means of configuring the program with one input from the S-Register (A- and B-Registers) and utilizing the parameters calculated by the program. The Manual method provides a means of configuring the program using the S-Register exclusively and allows modification of the parameters calculated by the program.

The Conversational or Manual methods of configuration must be used when a line printer is required by a diagnostic.

Prior to configuration, the operator may execute the Pretest to ensure that the basic instructions of the CPU can be executed and the drivers will be configured correctly.

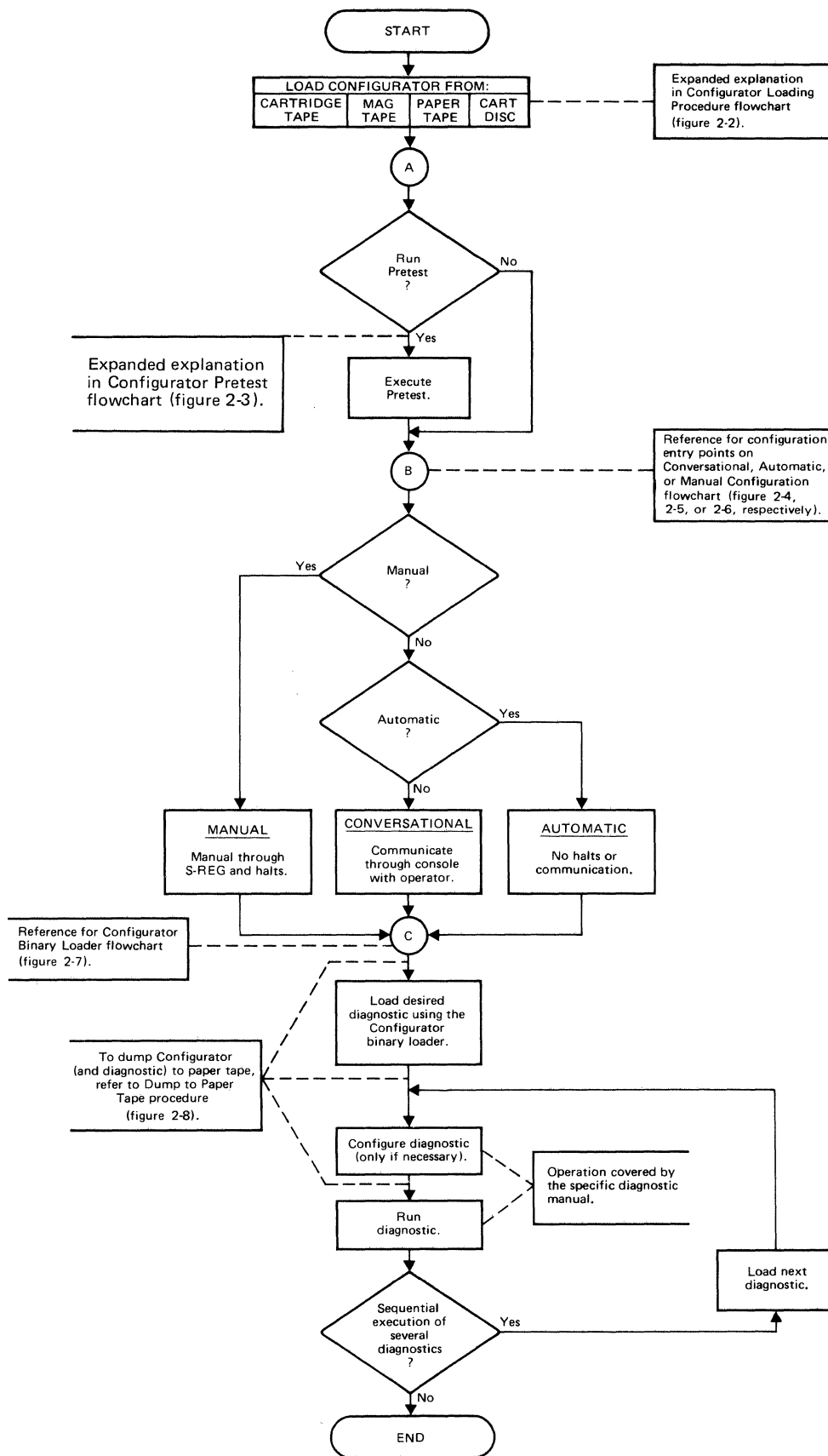
A general loading procedure flowchart for the various devices and computers is furnished as a quick reference in figure 2-1.

The basic configuration procedure is:

1. LOAD THE CONFIGURATOR PROGRAM (figure 2-2).

Note: Immediately after loading the Configurator (a diagnostic or a control program), the Diagnostic Serial Number (DSN) which resides in memory location 126 (octal) may be checked for a match with the information shown in the left-hand column of table A-1 in appendix A of this manual.

2. SET P-REG TO:
- (a) 2 → to execute the Pretest prior to configuration (figure 2-3).
 - (b) 100 → to start configuration directly.



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Figure 2-1. Operational Overview Flowchart

3. SET S-REG TO: (a) The console select code (Conversational, figure 2-4).

-or-

- (b) The console select code, diagnostic input device select code, and diagnostic input device type. Set bit 15 if the A-Register specifies a DSN and the B-Register the diagnostic to be loaded and executed following the specified DSN (Automatic, figure 2-5).

-or-

- (c) Clear (Manual, figure 2-6).

4. PRESS PRESET, RUN.

Note: Running time for the Configurator is entirely dependent upon the selection or deletion of the Pretest, the mode selected, and operator response time. (The Pretest requires approximately 10 seconds for a CPU with 32K of base memory.)

2-2. CONFIGURATOR LOADING PROCEDURE

Figure 2-2 is the flowchart for loading the Configurator. Paragraph 2-10 provides information for loading diagnostics after the Configurator is loaded and configured.

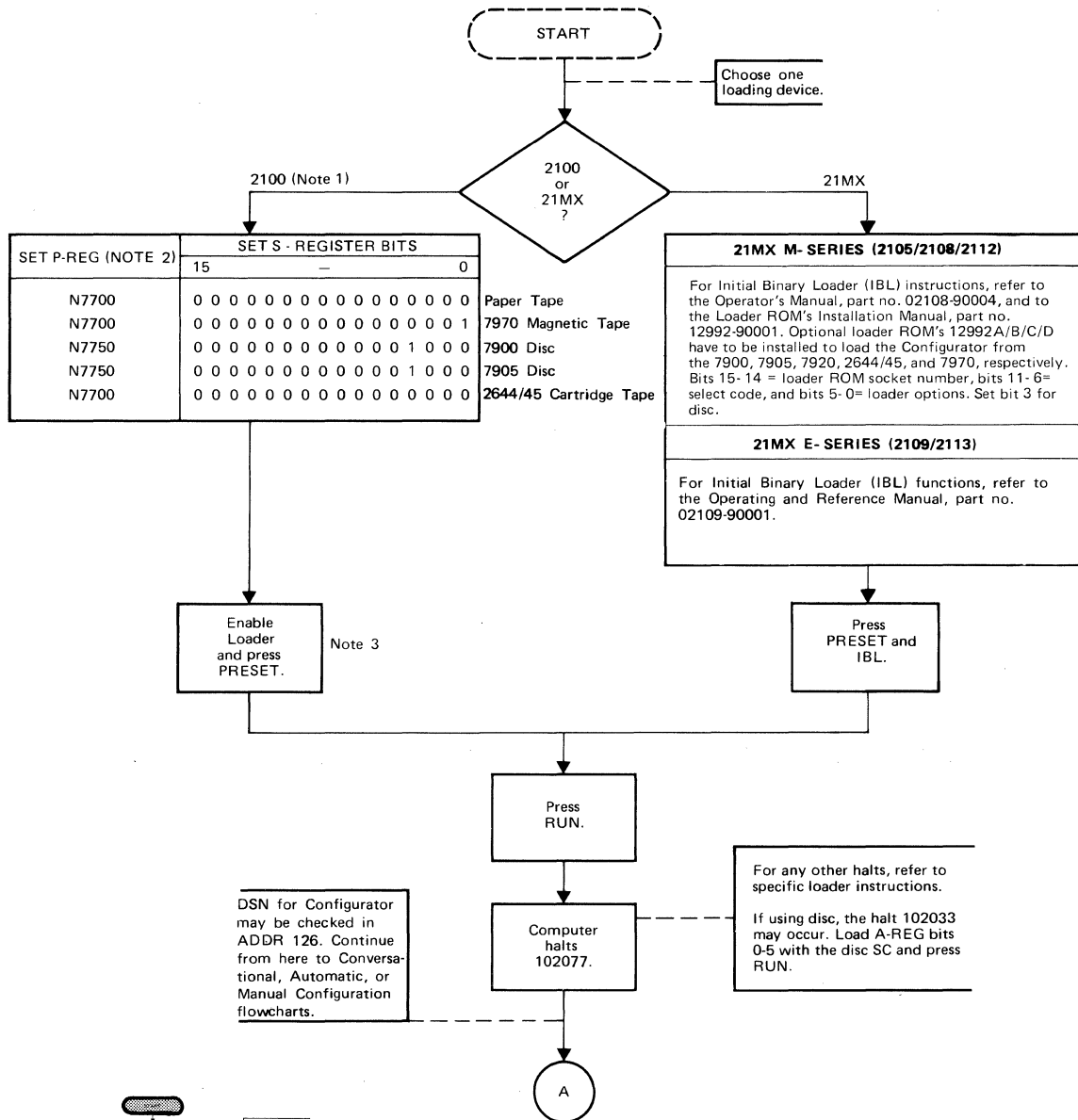
2-3. REGISTER USAGE

The following describes the use of the four registers (P, S, A and B) during configuration and the loading of diagnostics. The P-Register, as shown in the table below, shows the starting address of the various programs and the required registers.

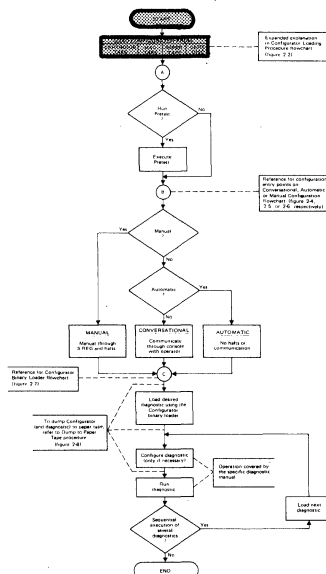
P-REGISTER	PROGRAM SELECTION	REQUIRED REGISTERS
2	Execute Pretest	S-A-B
100	Configure Diagnostic Configurator	S-A-B
120	Load Diagnostics	A-B
N7677	Dump to Paper Tape	S

2-4. S-REGISTER

As shown in the table below, the S-Register is used to indicate which configuration mode (Automatic, Conversational, or Manual) shall be used. If only the console is specified, then Conversational is used. If the console and the input device are specified, then Automatic is used. If the S-Register is left clear, then Manual is used. If a legal but incorrect SC is given for an I/O device, the result is unpredictable.



- NOTES:
1. HP 2100 or earlier (2114A/B, 2115A, 2116A/B/C).
 2. N = 0 for 4K, 1 for 8K, 2 for 12K, 3 for 16K, 4 for 20K, 5 for 24K, 6 for 28K, and 7 for 32K.
 3. For 2114A/B, press PRESET and LOAD simultaneously.



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Figure 2-2. Configurator Loading Procedure Flowchart

During the Paper Tape Dump routine, the SC of the punch is specified in the S-Register. (Refer to Dump routine in paragraph 2-11.)

S-REGISTER	INTERFACE TYPES & SELECT CODES	
	CONFIGURE (PRETEST)	DUMP ROUTINE
5-0	Console Select Code	Punch Select Code
11-6	Input Device Select Code	
14-12	Input Device Type	
15	Additional Parameters (in A- and B-Registers)	

2-5. A- AND B-REGISTERS

The two working registers have a special meaning when employed in conjunction with the Configurator Binary Loader. (See table 2-1.)

The A-Register has to be either loaded with the DSN of the diagnostic to be read into memory (and executed) or be cleared, in which case the next sequentially stored file in the input device will be loaded (and executed).

The B-Register has to be loaded with the bit pattern representing the appropriate diagnostic files to be loaded (and executed) following the diagnostic specified by the A-Register. B-Register bit 0 set will call for the execution of the diagnostic specified by the A-Register, bit 1 set will call for the execution of the next sequential diagnostic (file), etc. If the B-Register is cleared, the diagnostic specified in the A-Register will be loaded but not automatically executed. If any bit or bits are set in the B-Register, it will load and start execution of the selected diagnostic.

If both the A- and B-Register are not clear the Configurator will, after the specified diagnostics have been executed, return (rewind) to the first diagnostic specified and repeat the execution; i.e., loop on selected diagnostics.

Table 2-1. Summary of A- and B-Register Concept

B-REGISTER	A-REGISTER	
	CLEARED	SET TO DSN
Cleared	Load next file (diagnostic) and halt before execution.	Load specified diagnostic and halt before execution.
Set to bit pattern	Load next file and execute from there on each diagnostic specified in the B-Register one time.	Load specified diagnostic, execute from there on each specified diagnostic, and loop on all selected diagnostics.

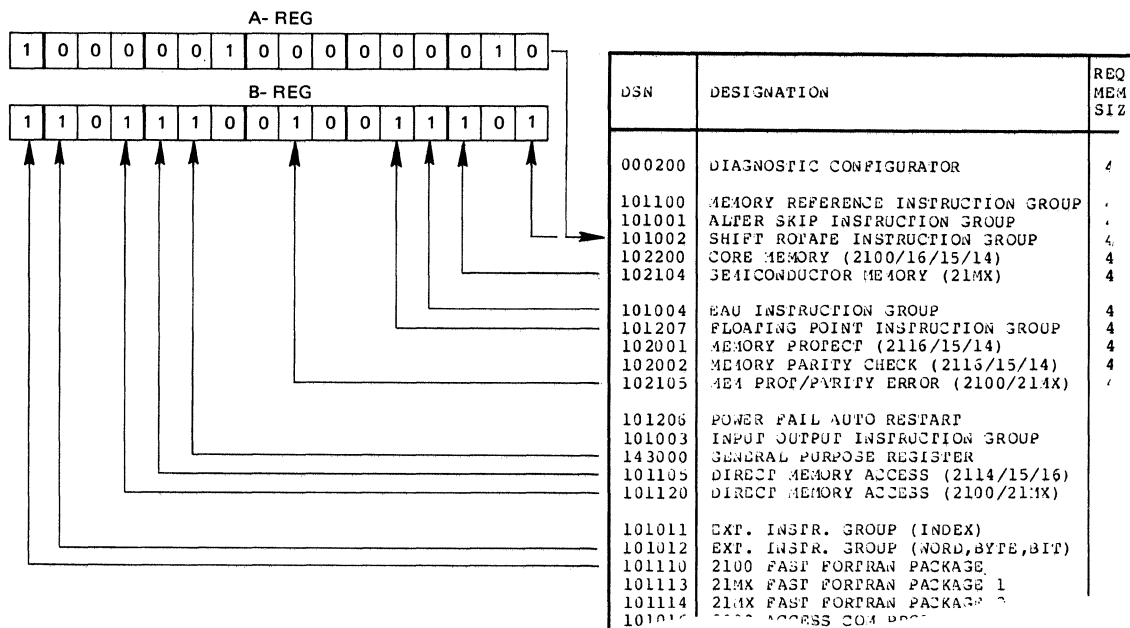
This concept enables the user to concatenate his own Long Diagnostic with the desired diagnostics. The A- and B-Registers are set prior to Automatic configuration (see paragraph

2-8) and at the end of Manual configuration (halt 102077; see paragraph 2-9). In the Conversational mode, the user inputs the information via the terminal in response to the message: DSN (SEQ.DIAG.EXECUT.) . . .

Example: A-REG → 101002: B-REG → 156235

A-REG → 101002: Load Shift-Rotate Instruction Group Diagnostic.

B-REG → 156235: Execute Shift-Rotate Instruction Group diagnostic, then load and execute sequentially the specified diagnostics.



If in the above example the B-Register carries the value 156234, the Shift-Rotate Instruction Group diagnostic will not be executed.

After the 2100 Fast FORTRAN Package diagnostic has been executed and the diagnostic media is disc or magnetic tape, the diagnostic execution will restart. In case of cartridge tape or paper tape, an end-of-tape halt 106070 will be reached at an earlier point. This is because the cartridge tape number 1, with 17 files stored, reaches an EOF after the DMA/DCPC (2100/21MX) diagnostic. In case of paper tape, the first EOF will be reached after the semiconductor memory diagnostic.

2-6. CONFIGURATOR PRETEST

This procedure provides a means to execute the Pretest (which is loaded as part of the Configurator) prior to any configuration. It should be used whenever the CPU, memory, or

basic I/O is in question. When it is executed and an error halt 102066 is encountered, the operator should refer to the listing in appendix D. An error-reporting method via a console is not employed for the Pretest because it verifies the basic integrity of the CPU, base memory, and basic I/O, which is a prerequisite for transferring data to a console. The approximate run time for the Pretest is 10 seconds for 32K of memory.

The memory section of the Pretest checks only the base memory. The basic I/O section of the Pretest requires a standard* I/O interface board with its SC specified. If installed, disconnect WCS accessory. The Configurator Pretest flowchart is shown in figure 2-3.

2-7. CONVERSATIONAL CONFIGURATION

This procedure, which provides a fully conversational configuration from the console, must be used when a line printer is required**. It should also be used (if possible) when the operator is not familiar with the program operation. This procedure requires a console with one of the console interfaces listed in paragraph 1-2c. The Conversational Configuration flowchart is shown in figure 2-4.

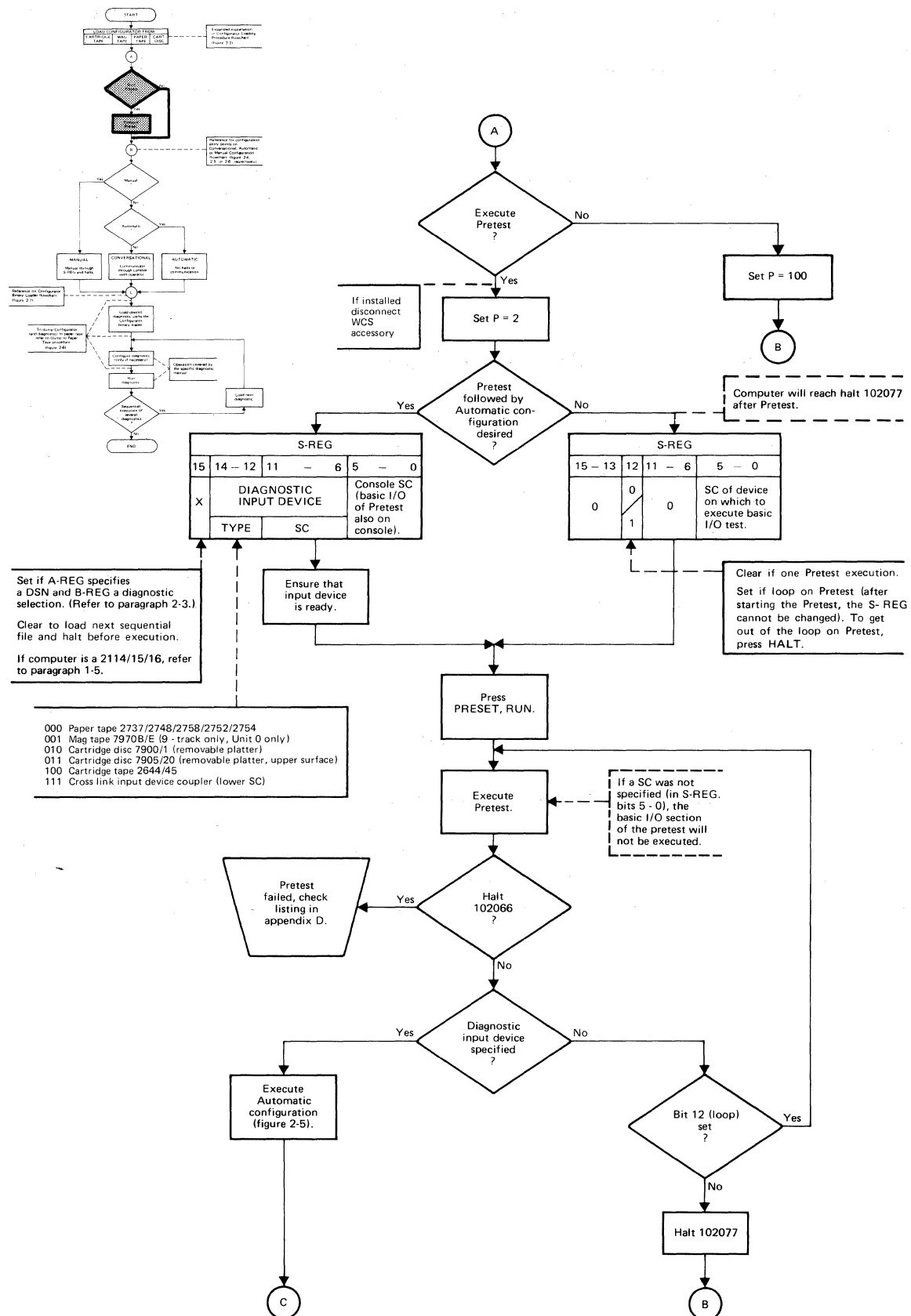
All inputs are terminated by a CR (carriage return). If an entry is found incorrect prior to entering a CR, the input can be erased by entering a RUBOUT/DELETE. In reply, the program will issue a CR/LF (line feed).

2-8. AUTOMATIC CONFIGURATION

This procedure provides a means to configure the program and load a diagnostic with one input from the S-Register. There are no messages on the console. The program configures the appropriate drivers and then loads a diagnostic. Because there is no report of what is calculated by the program, the operator must assume that the calculations were made correctly. For Automatic Configuration, figure 2-5 shows the expansion of point B to point C from the Operational Overview flowchart.

*Standard I/O implies that the interface will respond to the assigned meaning of the I/O instructions and will also interrupt when control and flag are set and the interrupt system is enabled.

**Manual method may also be used to specify (configure) a line printer driver.



7132-3

Figure 2-3. Configurator Pretest Flowchart



1. No response to this message is required. The printout shows the parameters calculated by the program. They are listed for operator reference only. The actual printout will depend on the computer and its options:

21MX M, 21MX E, 2114, 2115, 2116, 2100	Computer type
NO MPRT or MPRT	Memory protect
NO DMA or DMA	Direct Memory Access/Dual Channel Port Controller
32K MEMORY	Calculated base memory size, this does not include Memory Expansion Unit.

- Respond with the appropriate line printer model number and select code.

mmmm = 2767, 2610, 2614, 2613, 2617, 2618, 2778, 2607 or 9866
 \ NONE (if not available)
 LINK (if cross link is used)
SC = Line printer select code.
- Respond with the appropriate device number (or LINK) and select code.

nnnn = 2737, 2748 or 2758 Paper tape devices
 = 7970 Mag tape (9 - track only, Unit 0 only)
 = 7900 or 7901 Cartridge disc (removable platter only)
 = 7905/20 Cartridge disc (removable platter, upper surface)
 = 2644 or 2645 Cartridge tape
 = LINK (if cross link input device coupler is used)
SC = select code of device (Lower SC in case of 2 SC)
- Respond with the desired Diagnostic Serial Number for the indicated value of xxxxxx.
Refer to appendix A for a list of available diagnostics and their DSN's. If 0 is entered, the next consecutive binary file will be loaded from the input device.

The value `yyyyyy` may be entered for the octal equivalent of the binary bits selecting the desired diagnostic. (The program will load the values `xxxxxx` into the A-REG and `yyyyyy` into the B-REG and interpret as explained in paragraph 2-3.) If `yyyyyy` is not entered, the program sets the B-REG to `000000`.

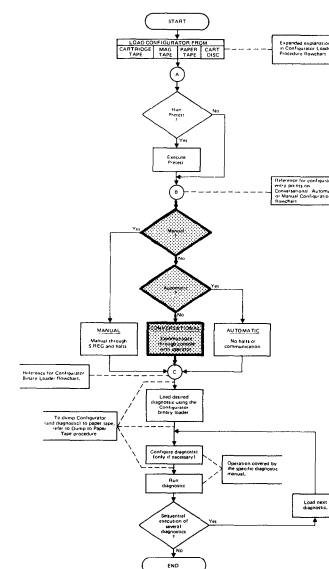


Figure 2-4. Conversational Configuration Flowchart

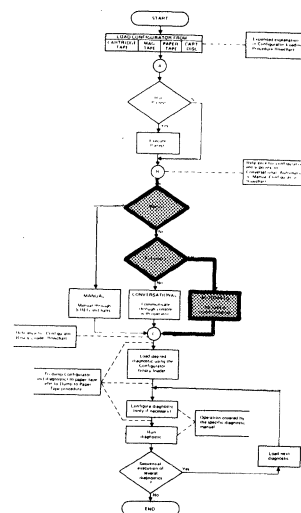
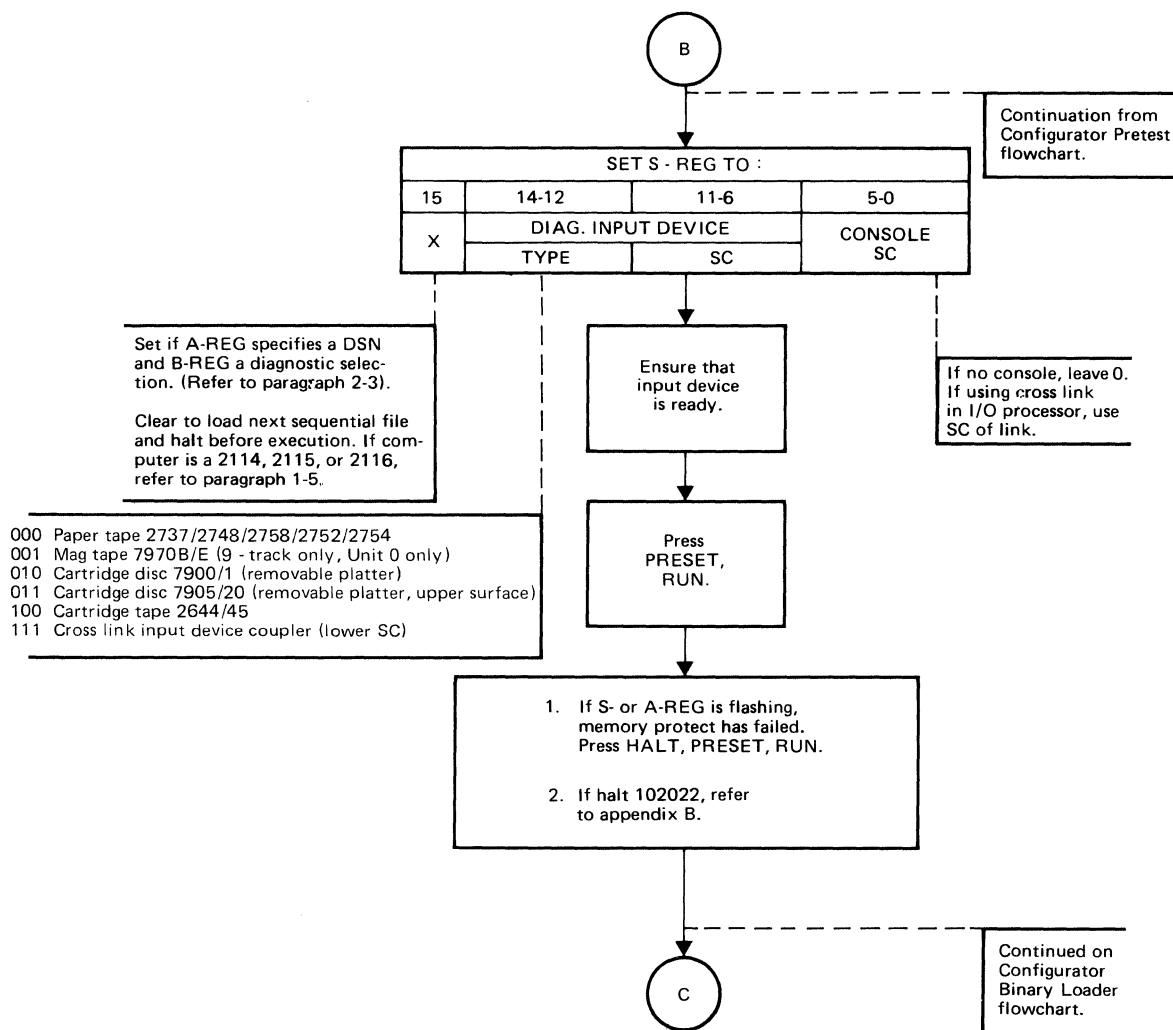


Figure 2-5. Automatic Configuration Flowchart

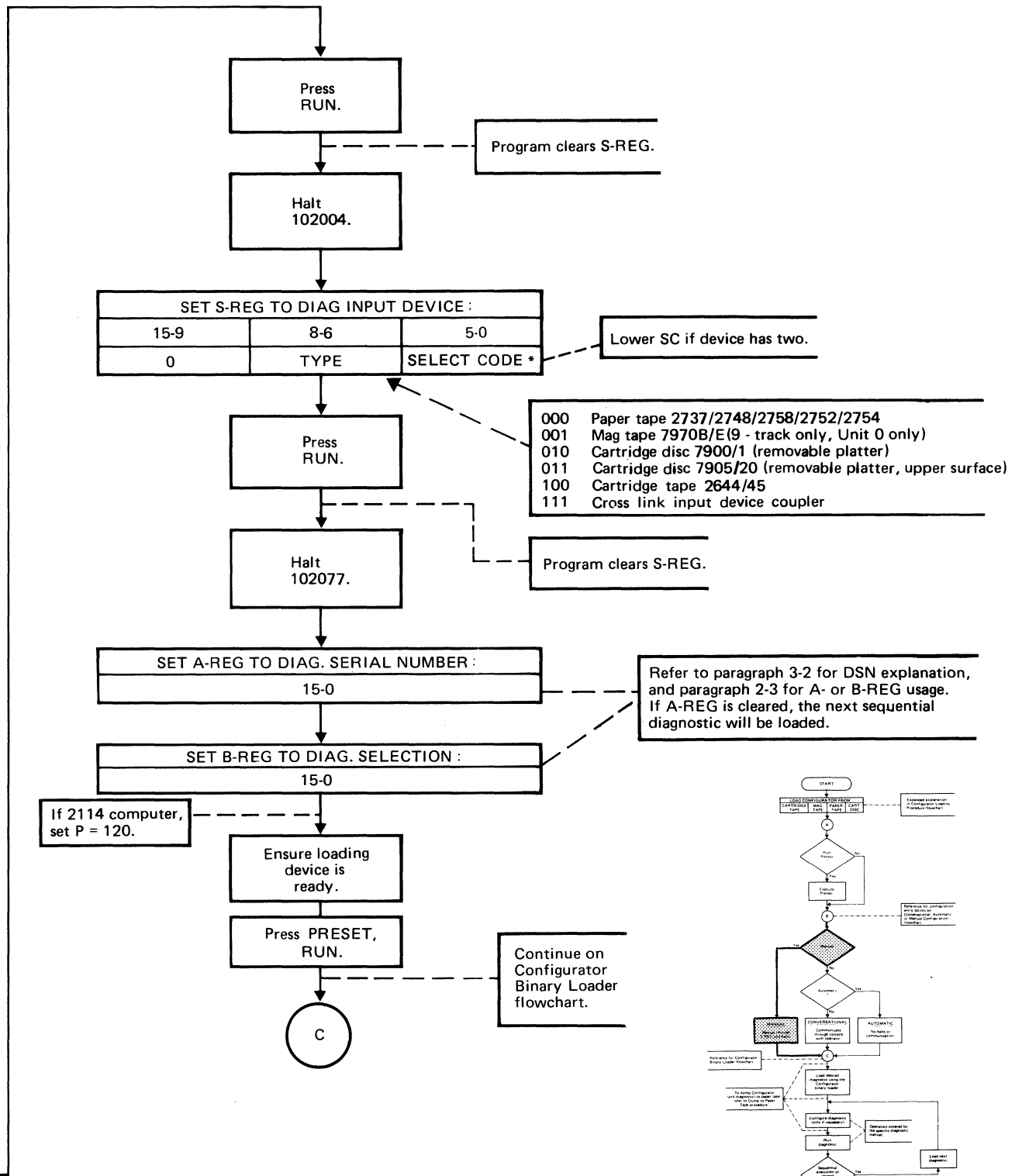
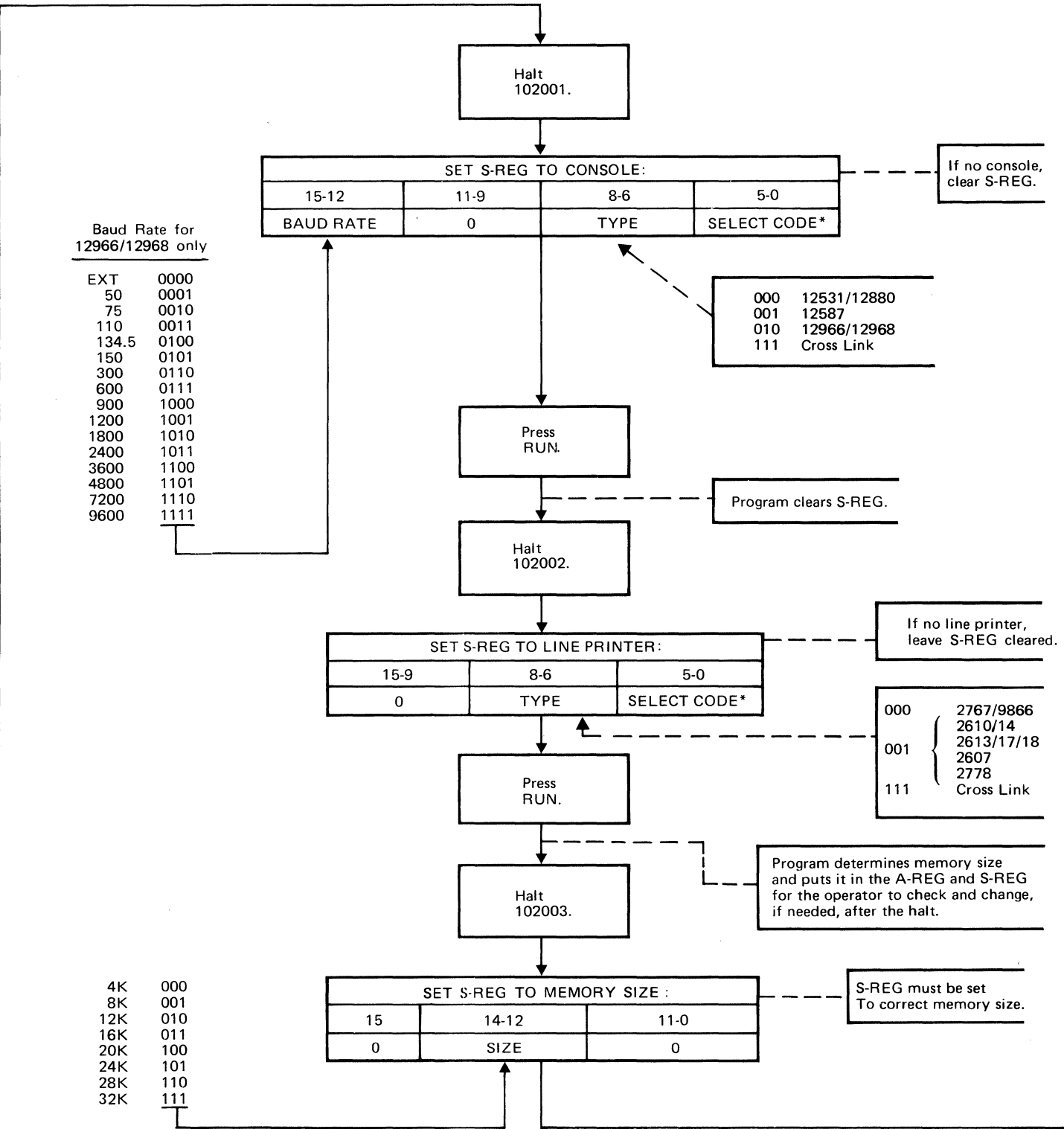
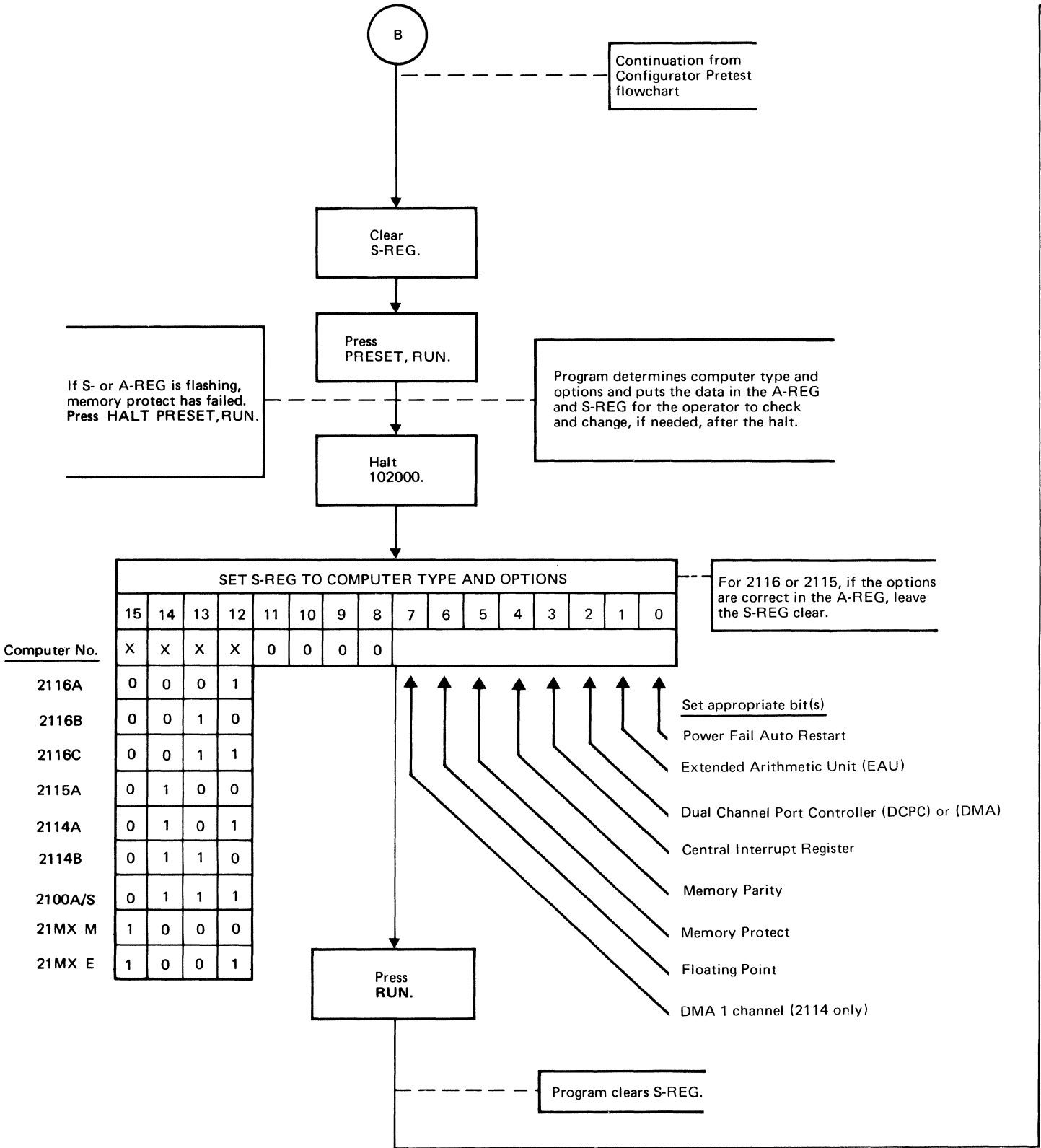
2-9. MANUAL CONFIGURATION

This procedure allows complete configuration through the S-Register via five halts. The program calculated parameters are displayed in the A- and S-Registers at the appropriate halts (0 and 3). When the operator presses RUN, the S-Register is read and the information supersedes the calculated value.* The basic halts and required inputs are:

HALTS	INPUT
102000	Computer type and options.
102001	Console interface type and select code.
102002	Line printer type and select code.
102003	Memory size.
102004	Diagnostic input device type and select code.
102077	Configuration complete.

After halt 102077, the program exits to the Configurator Binary Loader routine to accept a DSN in the A-Register and a sequential execution bit pattern in the B-Register. (Refer to paragraph 2-3b.) The Manual Configuration flowchart is shown in figure 2-6.

*If the S-Register is cleared at halt 102000, the program calculated parameters are used for configuration. This is ordinarily useful on the 2116 and 2115 where the S-Register is already cleared and the A-Register contains the correct parameters.



* If using cross link in I/O processor, use SC of link.

Figure 2-6. Manual Configuration Flowchart.

2-10. CONFIGURATOR BINARY LOADER

The Configurator Binary Loader is used to load diagnostic programs from the following devices:

- a. Paper Tape Readers; (Type 0)*: HP 2737, 2748, 2758, or teleprinter with paper tape reader.
- b. Magnetic Tape; (Type 1)* (requires DMA/DCPC), (Unit 0 only): HP 7970B/E 9-track only, interfaces = 13181, 13183, 18184.
- c. Cartridge Disc; (Types 2 and 3)* (requires DMA/DCPC), (Unit 0 only): HP 7900/1 Removable platter or HP 7905 Removable platter, upper surface.

The loader utilizes memory addresses N6300 through N6500 as a sector buffer for the disc loader. Diagnostics are loaded starting at address 130 and they may extend into the sector buffer area. Therefore, prior to loading the diagnostic, the upper memory boundary required to load the diagnostic is tested. If it reaches beyond N6300, the loader program will halt with 106073 displayed. Three possible routes can then be chosen by the operator as follows:

- (1) Load the desired diagnostic from a different device.
 - (2) Restart the loader and specify another DSN.
 - (3) Continue loading the diagnostic from disc but be aware that the overlaid buffer may cause unpredictable results.
- d. Cartridge Tape; (Type 4)*: HP 2644 or 2645 Terminal with 12966 interface.
 - e. Cross Loader Coupler; (Type 7)*: This is not a true loader but it allows the program to cross link to a loader driver in the central processor. The data checking (checksum and address violation) is done in the I/O processor (or slave) and only the device driver is used in the central processor. (See paragraphs C-10 through C-14.)

When using the loader, the files are searched until the specified Diagnostic Serial Number is found. If the specified DSN is not found, the program will halt 106070. When the Configurator Binary Loader has loaded the desired diagnostic and the B-Register was cleared, the program halts 102077 with the A-Register carrying the DSN contained in address 126.

To load the next consecutive binary file, clear the A- and B-Registers, set P=120, press PRESET and RUN.

All files are assumed to be absolute and the record length is not longer than 60 words including the count, address, and checksum. The flowchart for the Configurator Binary Loader is in figure 2-7.

*Type numbers refer to S-Register bits 14 through 12 in Automatic Configuration and S-Register bits 8 through 6 after halt 102004 is reached in Manual Configuration. They are also placed in memory location 111 with the select code.

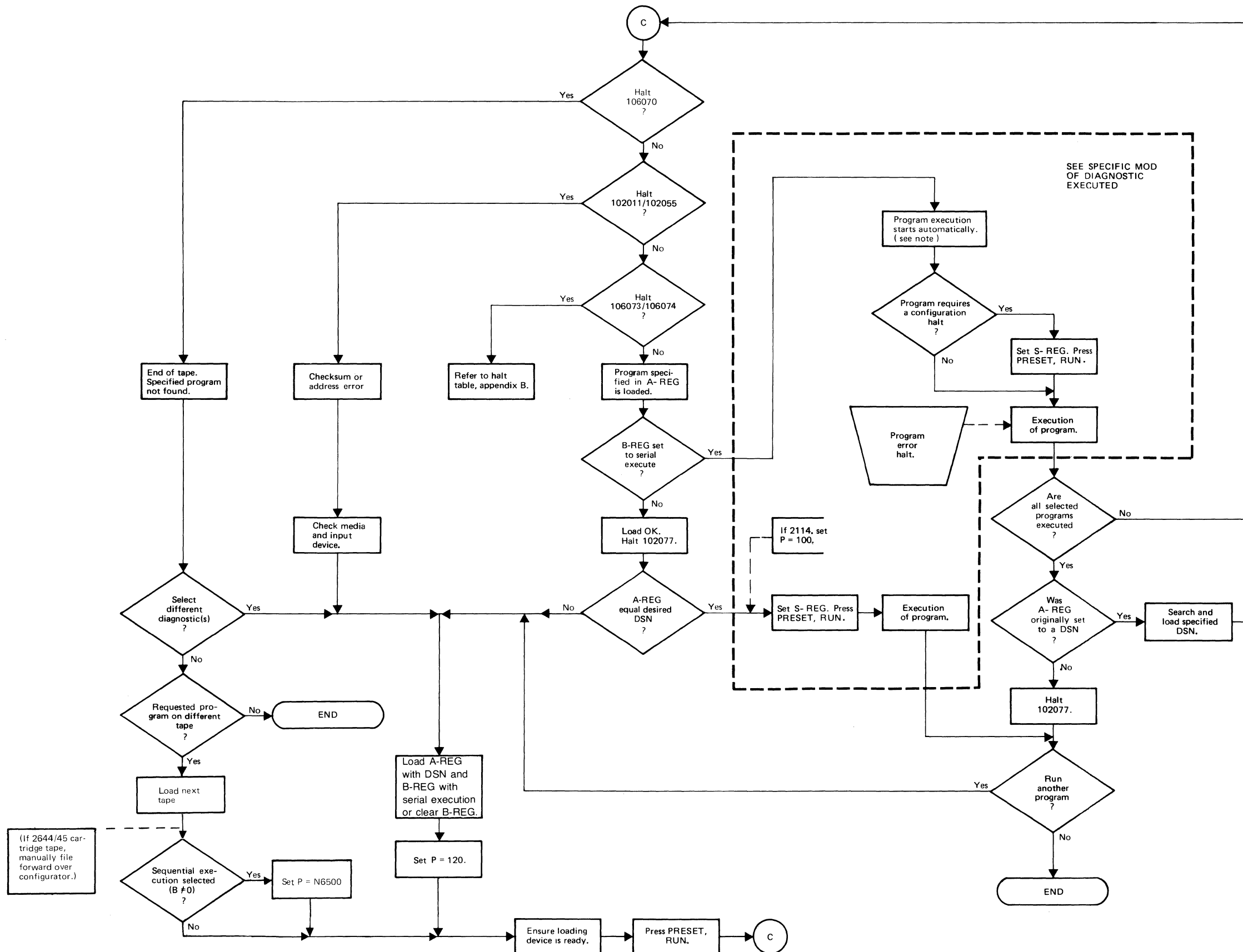
2-11. DUMP TO PAPER TAPE

The Paper Tape Dump Routine can be employed to dump (a) the configured Configurator, (b) the configured Configurator and an unconfigured diagnostic, or (c) the configured Configurator and a configured diagnostic. The requirements are as follows:

- a. The paper tape loader must be specified during configuration as the diagnostic input device. The Configurator can therefore be loaded from any one of the specified input devices; the diagnostic, however, must be loaded from the paper tape reader. The Configurator must be configured manually.
- b. The dump device must be one of the following:

 HP 2895, 2753 (punches)
 HP 2752, 2754 (teleprinter tape punch device)
- c. The desired diagnostic should be loaded. It can also be configured. If a diagnostic is not loaded, only a copy of the Configurator Linkage Area, Utility Routines, and Drivers will be dumped to tape.

The Paper Tape Dump Routine flowchart is shown in figure 2-8.



NOTE:
If sequential execution of diagnostics has been selected and the diagnostic just loaded requires a configuration input an error halt (normally 102073) will be reached. Refer to the appropriate manual of diagnostics.

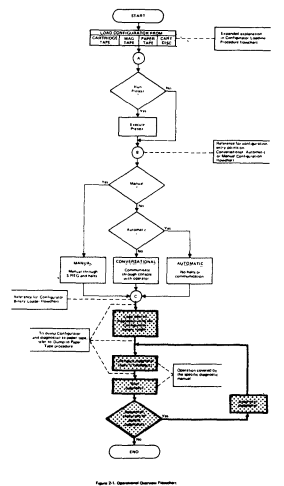
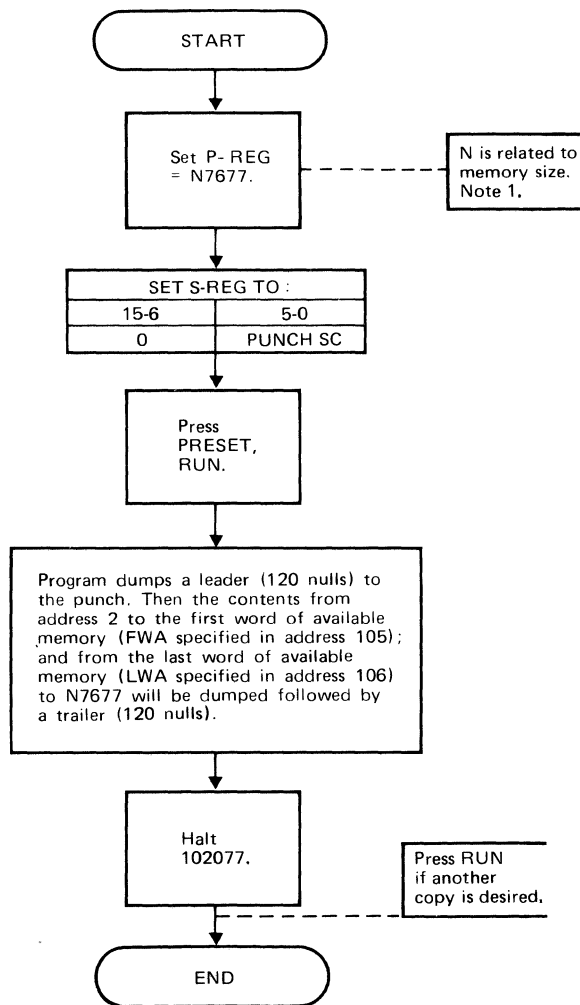


Figure 2-7. Configurator Binary Loader Flowchart



1. N=0 for 4K, 1 for 8K, 2 for 12K, 3 for 16K, 4 for 20K, 5 for 24K, 6 for 28K, and 7 for 32K.

Figure 2-8. Paper Tape Dump Routine Flowchart

PROGRAM DESCRIPTION

SECTION

III

3-1. GENERAL ORGANIZATION

The program is organized according to the memory map shown in figure 3-1. The map also includes the paragraph number that describes that area or function. The addresses shown in figure 3-1 are effective prior to configuration. Utility Routines and Configured Drivers are moved during configuration to the corresponding addresses in the last page of memory.

The area from 130 to N6477* may be overlayed when a diagnostic is loaded.

3-2. CONFIGURATOR LINKAGE AREA

This area, starting at address 100, is reserved by the Configurator for address links to utility routines and drivers. It also has data referenced by the diagnostic for computer parameters such as DMA/DCPC available, Memory Protect, memory size, etc. Refer to figure 3-2 for details of the linkage area.

When a diagnostic is loaded, it will overlay the JMP START (address 100), FWA (address 105), and DSN (address 126). The configurator loader does not protect the linkage area when a binary file is loaded.

The JMP START from address 100 establishes a common starting point for all diagnostics.

The FWA is the first unused memory location after the area occupied by the diagnostic. The area between the FWA and LWA is essentially unused memory. The LWA is established by the Configurator utility routines and is set to N6477 which is the last unused memory location before the routines. Some diagnostics use the area (FWA to LWA) as a buffer area. When dumping to paper tape, this area is not dumped; only locations 2 to FWA- 1 and LWA+ 1 to N7677.

The DSN (Diagnostic Serial Number) is used to identify any diagnostic in memory. (See figure 3-3.) Each diagnostic is assigned a DSN when it is originally written and the revision number in the DSN is incremented each time the diagnostic is updated. The DSN allows the operator to check exactly what diagnostic and which revision of the diagnostic is loaded.

Any prereleased diagnostics or control programs will carry a pseudo-DSN of 177777. Figure 3-3 describes the DSN in detail. A diagnostic control program loads individual diagnostics, supplies parameters necessary for diagnostic execution, and/or monitors the sequential execution of discrete diagnostics.

*N is related to memory size. Also see figure 2-2, note 2.

3-3. PRETEST

The Pretest consists of a check to ensure that all major base set instructions work correctly. This is a cursory check and is not meant to replace any CPU Diagnostics. Each instruction is checked in a general manner and the entire base memory is checked with several patterns. When the Pretest passes, configuration can be performed with relative assurance that the basic computer is functional.

Four possible halts that can be encountered during the Pretest are as follows:

- a. When an error occurs (halt 102066) the operator must refer to the Pretest listing in appendix D. Any malfunctions must be corrected before continuing.

DESCRIPTION PARAGRAPH	STARTING MEMORY ADDRESS	FUNCTION
—	10	Trap cells for I/O select codes.
3-2	100	Configurator linkage area (figure 3-2).
3-3	130	Pretest part A.
	1400	Storage.
3-3	2000	Pretest part B.
3-4	3000	Establish computer parameters (memory size, DMA, MPRT, and computer type).
3-5		Configuration of drivers a. Console b. Line printer c. Diagnostic input device.
2-9		Manual configuration.
3-6	4000	Table of drivers a. Consoles b. Line printers c. Diagnostic input devices.
3-7	N6500	Utility routines
3-14	N7000	Configured drivers a. Console driver b. Line printer driver c. Diagnostic input device driver.
	N7700	Basic Binary Loader (protected area or IBL).
Note: The shaded area represents an area protected by the Configurator or an area within the BBL. An attempt to write into location N6500-N7777, when using the Configurator Binary Loader, will result in a halt 102055. Any programs loaded shall not overwrite the configurator linkage area (location 100-127), except locations, 100, 105, 116 and 126.		

Figure 3-1. Memory Map

OCTAL ADDRESS		CONTENTS	MEANING
100		JMP START	GO TO START OF USER PROGRAM
101		NOP	RESERVED
102		DEF CNSLO	CONSOLE OUTPUT DRIVER
103		DEF LNPTR	LINE PRINTER DRIVER
104		DEF CNSLI	CONSOLE INPUT DRIVER
105	FWA	OCT 130	FIRST WORD OF AVAILABLE MEMORY
106	LWA	OCT 6477	LAST WORD OF AVAILABLE MEMORY
107		DEF LOADR	LOADER PROGRAM
110	TMC	DEC -200	1 MILLISEC. TIME COUNT
111		OCT 0	LOADER SELECT CODE
112		OCT 0	CONSOLE SELECT CODE (0=NOT AVAILABLE)
113		OCT 0	LINE PRINTER SELECT CODE (0=NOT AVAILABLE)
114		OCT 0	CONSOLE SELECT CODE (0=NOT AVAILABLE)
115		OCT 0	COMPUTER TYPE/OPTIONS
116		OCT 0	USER CARD TYPE AND SC
117		OCT 0	MEMORY SIZE
120		JSB 107B,1	GO TO LOADER PROGRAM
121		DEF TMR	1 MILLISEC. TIMER ROUTINE
122		DEF SWR	CHECK S-REG
123		DEF D2ASC	DECIMAL TO ASCII CONVERSION
124		DEF O2ASC	OCTAL TO ASCII CONVERSION
125		DEF ASC2N	ASCII TO NUMBER CONVERSION
126	DSN	OCT 000200	DIAGNOSTIC SERIAL NUMBER (CONF./REV. 1)
127		DEF FMTR	FORMATTER ROUTINE

REV B

Figure 3-2. Linkage Area

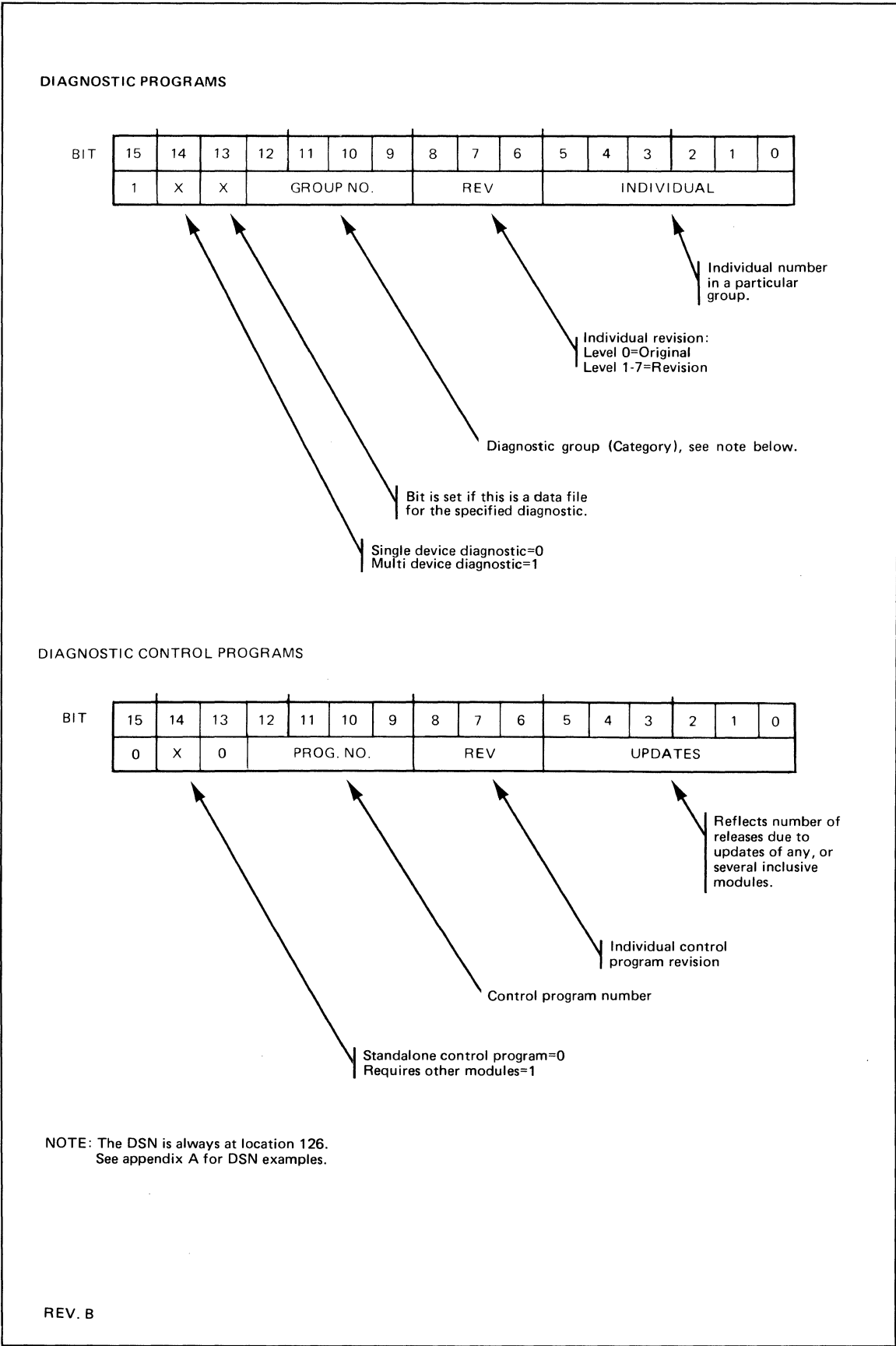


Figure 3-3. Diagnostic Serial Number (DSN)

- b. Halts 102020 and 102021 can occur only when testing a 2115 or 2116 computer where the S-Register cannot be modified under program control.
- c. Halt 102077 indicates successful Pretest execution.

3-4. COMPUTER PARAMETERS

The parameters calculated by the program are: computer type, DMA/DCPC, Memory Protect, and memory size. After being calculated, the computer type is used to look up the standard features, and the 1-millisecond timing constant. See figure 3-4 for computer type and options parameter details and figure 3-5 for memory size parameter details.

The calculated parameters are printed on the console device when Conversational Configuration is used. They are displayed in the A- and S-Registers when Manual Configuration is used. The display of parameters is for operator reference. If the parameters are wrong, it is a direct indication that the appropriate hardware has failed. The operator can correct the parameters by using Manual Configuration.

BIT	SET IF AVAILABLE	21MX E	21MX M	2100 A/S	2116 A/B/C	2115 A	2114 A/B
0	POWER FAIL AUTO RESTART	1	1	1 1	X X X	X	X X
1	EXTENDED ARITHMETIC UNIT	1	1	1 1	X X X	X	0 0
2	DMA/DCPC	X	X	X 1	X X X	X	0 X
3	CENTRAL INTERRUPT REG.	1	1	1 1	X* 1 1	X*	0 1
4	MEMORY PARITY CHECK	1	1	1 1	X X X	X	X X
5	MEMORY PROTECT	X	X	1 1	X X X	0	0 0
6	FLOATING POINT	1	1	X 1	0 0 0	0	0 0
7	DMA (1 CHANNEL ONLY)	0	0	0 0	0 0 0	0	0 1
8	RESERVED	0	0	0 0	0 0 0	0	0 0
9	RESERVED	0	0	0 0	0 0 0	0	0 0
10	RESERVED	0	0	0 0	0 0 0	0	0 0
11	RESERVED	0	0	0 0	0 0 0	0	0 0
12	} COMPUTER TYPE CODE }	1	0	1 1	1 0 1	0	1 0
13		0	0	1 1	0 1 1	0	0 1
14		0	0	1 1	0 0 0	1	1 1
15		1	1	0 0	0 0 0	0	0 0

NOTES: * = ON EARLIER MODELS THIS WAS AN OPTION
X = OPTIONAL FEATURE AVAILABLE ON INDICATED COMPUTER.
0 = FEATURE NOT AVAILABLE ON INDICATED COMPUTER.
1 = STANDARD FEATURE ON INDICATED COMPUTER.

LINKAGE AREA , ADDRESS 115.

Figure 3-4. Computer Type and Options

In determining the computer type, it should be noted that the Configurator cannot distinguish between a 2115 and 2116 computer. The program will default to a 2115 calculation if the calculated memory size is 8K or less.

The S-Register will flash to indicate a hardware problem if one exists when checking for MPRT. The operator must press HALT, PRESET, RUN.

3-5. CONFIGURATION OF DRIVERS

The device drivers are written in such a way that only the basic hardware differences (in programming for each device and interface) are kept in a table. One table is used for each driver (console line printer and diagnostic input device). When a device is specified, the appropriate driver is moved from the table to the driver area of the Configurator. During the move the select code is set to the one specified by the operator. If a cross link is specified, the program will only configure the driver that has been loaded into the driver area. Refer to paragraph C-10. If no device is specified, a pseudo-driver is used so that if the diagnostic calls that driver no action is taken. The select code in the base page is also cleared to indicate that there is no device for that driver. When using Conversational or Automatic Configuration, the Configurator program determines the console interface type installed in the select code specified by the operator. If the Configurator is unsuccessful in determining the interface type, the program will halt 102022. The operator must enter a new select code or use Manual Configuration.

If a line printer was not specified during configuration, a pseudo-driver is used to call the console output driver. Therefore, in the event the diagnostic calls the line printer driver, the message will appear on the console.

The Configurator program asks for the device model number of the diagnostic input device and the select code during configuration. This data is used to look up the Binary Loader driver.

MEMORY SIZE	15	14 13 12	11-0
4K	0	0 0 0	0
8K	0	0 0 1	0
12K	0	0 1 0	0
16K	0	0 1 1	0
20K	0	1 0 0	0
24K	0	1 0 1	0
28K	0	1 1 0	0
32K	0	1 1 1	0
LINKAGE AREA, ADDRESS 117.			

Figure 3-5. Memory Size

If the diagnostic input device model number cannot be found during input, the request line will be output repeatedly until a valid device number is entered. The same situation applies to the select code if the entry is greater than 77 or less than 10.

3-6. TABLE OF DRIVERS

The tables consist of console, line printer, and diagnostic input device drivers. The drivers in each table are written in a format that can be relocated to the driver routine area of memory during configuration. Primarily, the tables represent hardware differences (in programming) that must be known in order to interface with the driver routines.

The tables contain the following device drivers:

- a. Console:
12531/12880
12587
12966
- b. Line printer:
2767/9866
2607/2610/2613/2614/2617/2618/2778
- c. Diagnostic Input Device:
Paper tape: 2737, 2748, 2758 (or teleprinter)
Magnetic tape: 7970B/E (9-track unit 0)
Cartridge disc: 7900/1 (unit 0, removable platter only)
Cartridge disc: 7905/20 (unit 0, removable platter, upper surface only)
Cartridge tape: 2644/2645 terminal

3-7. UTILITY ROUTINES

The following six paragraphs, listed below, describe the calling sequence for each of the Utility routines. The routines are generally required by diagnostics and are therefore incorporated in the configurator and are not overlayed by the diagnostic. These routines do not change the interrupt system and are interruptable at any point if the interrupt system is enabled.

- a. Timer or Wait Loop.
- b. S-REG Check.
- c. Decimal (Integer) to ASCII Conversion.
- d. Octal to ASCII Conversion.
- e. ASCII to Number (Binary) Conversion.
- f. Formatted Output.

The routines will not be directly used by the operator and are described here only to provide a broader scope of understanding the Configurator. The information can be used as a basis for creating individual diagnostics to run under the Configurator.

3-8. TIMER OR WAIT LOOP (ONE MILLISECOND)

CALLING SEQUENCE:

	LDA	TIME	NUMBER OF MILLISEC.
P	JSB	121B,I	GO TO TIMER
P+1	...		NORMAL RETURN
TIME	DEC	100	100 MILLISEC.

From P to P+1 = Time $\times$ 1 millisecond.

3-9. S-REGISTER CHECK

CALLING SEQUENCE:

	LDB	SW10	SWITCH NUMBER
P	JSB	122B,I	CHECK IT
P+1	...		RETURN IF SWITCH(ES) IS ON
P+2	...		RETURN IF SWITCH IS OFF
SW10	OCT	002000	S-REG BIT 10

Upon entry the B-register contains the mask for the switch(es) of interest. The return is P+2 if the switch is off (or all off) or P+1 if any switches in question are on.

3-10. DECIMAL TO ASCII CONVERSION

CALLING SEQUENCE:

	CLE		START WITH UPPER HALF (CCE= LOWER*)
	LDA	DECNO	GET NUMBER FOR CONVERSION
	LDB	BFPTR	GET LOCATION IN BUFFER TO STORE THE CONVERTED NUMBER
	JSB	123B,I	MAKE CONVERSION
	...		NORMAL RETURN
DECNO	DEC	-32000	DECIMAL VALUE
BFPTR	DEF	***	POINTER TO BUFFER

The above call will result in the following:

BFPTR	—	3	
	2	0	ASCII characters in memory.
	0	0	

Note: The routine does a right justify. The contents of the A- and B-Registers are lost.

3-11. OCTAL TO ASCII CONVERSION

CALLING SEQUENCE:

CLE		START WITH UPPER HALF (CCE=LOWER*)
LDA	OCTN	GET OCTAL NUMBER TO BE CONVERTED TO ASCII
LDB	BFPTR	GET LOCATION IN BUFFER TO STORE THE CONVERTED NUMBER
JSB	124B,I	MAKE CONVERSION
...		NORMAL RETURN

OCTN	OCT	034567
------	-----	--------

The above call will result in the following:

BFPTR	0	3	
	4	5	ASCII characters in memory.
	6	7	

Note: The routine does a right justify. The contents of the A- and B-Registers are lost.

3-12. ASCII TO BINARY CONVERSION

Converts a decimal or octal ASCII coded number in memory to a binary number and puts it in the A-Register. This routine will accept ASCII numbers only, 60 to 70 (octal). Any other characters will terminate the conversion or the routine will terminate after converting the sixth character.

CALLING SEQUENCE:

CLA		DECIMAL CONVERSION (CCA=OCTAL)
LDB	BFPTR	GET LOCATION IN BUFFER TO STORE THE CONVERTED NUMBER
CLE		START WITH UPPER HALF (CCE=LOWER*)
JSB	125B,I	MAKE CONVERSION
...		NORMAL RETURN
		A-REG = CONVERTED NUMBER
		B-REG = BUFFER ADDRESS OF NEXT CHARACTER
		E-REG = UPPER/LOWER CHARACTER*

3-13. FORMATTED OUTPUT

To make it easier for programming, a simple format output call is available. This allows more room for the diagnostic.

*A four word buffer is required in this mode.

CALLING SEQUENCE:

CLA,	CLE (see note 1)	FORMAT STARTING
LDB	FMTA	POINTER TO FORMAT STRING
JSB	127B,I	CALL FOR OUTPUT
...		NORMAL RETURN
		A = 0 (OUTPUT COMPLETE)
		B = 0
		or
		A = 43 (# WAS REQUESTED)
		B = N.A.

```

FMTA  DEF  *+1
      ASC  7,FORMAT OUTPUT/

```

FORMAT CONTROL CHARACTERS

= NUMBER OUTPUT (See explanation — next page.)

/ = OUTPUT BUFFER WITH A CR-LF (OR PRINT IF OUTPUTTING TO LINE PRINTER)

← = OUTPUT BUFFER WITHOUT A CR-LF (OR SUPPRESS PRINT OF PENDING BUFFER, IF OUTPUTTING TO LINE PRINTER, UNTIL A /CONTROL CHARACTER IS ENCOUNTERED)

/ = or ← will cause a return with the original A- and B-REGS.

Note 1: CLA, CLE = OUTPUT TO CONSOLE
 CLA, CCE = OUTPUT TO LINE PRINTER

CALLING SEQUENCE: (number output)

This call can be used *only* in conjunction with the calling sequence above.

CCA	(see note 2)	OUTPUT NUMBER (OCTAL)
LDB	NMBR	GET NUMBER FOR OUTPUT
JSB	127B,I	CONTINUE FORMAT OUTPUT WITH NUMBER
...		RETURN

Note 2: CCA = OUTPUT NUMBER IN OCTAL
 CLA, INA = OUTPUT NUMBER IN DECIMAL

If a call is made for a number output but a format has not been established, no action is taken and control is returned to P+ 1.

When the Format routine is started (A=0), the formatter moves each character in the string to a buffer. Each character is examined for the three control characters. If the character is #, a jump back to the caller is made. The program then indicates the type of conversion and passes the number back. The number is then converted and added to the buffer. The formatter will then continue to move each character until another control character is found. If the output string is larger than the format buffer, the buffer is output but no CR-LF or PRINT command is given. This process continues until a terminating control character is found (/ or ←).

*A four word buffer is required in this mode.

3-14. CONFIGURED DRIVERS

The following paragraphs (listed below) describe the calling sequence for each of the drivers (console, line printer, and diagnostic input device) available to the diagnostic program.

- a. Console Output.
- b. Console Input.
- c. Line Printer Output.
- d. Binary Loader.

3-15. CONSOLE OUTPUT

- a. Calling Sequence:

LDA	CNT	BUFFER COUNT
LDB	BUFA	BUFFER ADDRESS
JSB	102B,I	CALL CONSOLE OUTPUT DRIVER
.		RETURN WHEN COMPLETE
.		A + B MEANINGLESS

- b. Count and Address:

The count is the positive number of 8-bit characters in the buffer. The address is the absolute memory location of the first byte in the buffer.

Note: The count cannot be negative, the results are unpredictable. A buffer count of zero will issue a CR-LF to the console.

- c. Call Console Output Driver:

This call will initialize an output of the specified buffer. The buffer is unpacked 8 bits (1 byte) at a time and transferred to the console. When the transfer has reached the count, a carriage return (CR) line feed (LF) is issued and the driver returns to the caller. If, during a transfer, a RUBOUT character is found, the driver will return to the caller at that point regardless of the remaining count, and no carriage return or line feed is issued.

3-16. CONSOLE INPUT

- a. Calling Sequence:

LDA	CNTMX	MAXIMUM INPUT COUNT
LDB	BUFA	BUFFER ADDRESS
JSB	104B,I	CALL CONSOLE INPUT DRIVER
		RETURN WHEN COMPLETE
		A = NUMBER OF CHARACTERS INPUT BY THE OPERATOR
		B = MEANINGLESS

b. Count and Address:

The count is the positive maximum number of 8-bit characters to be input and loaded into the buffer. The address is the absolute memory location of the buffer.

Note: The count cannot be negative or zero, the results are unpredictable.

c. Call Console Input Driver:

This call will initialize an input from the console device. The characters will be put in the buffer in packed format (8-bit bytes) until the operator enters a CR (carriage return), or the buffer is filled.

Note: The driver automatically takes care of a RUBOUT (or delete) by the operator, issues a CR/LF, and resets the pointers to the start of the buffer. The driver requires only a CR to terminate an input.

d. Return:

When the operator enters a line feed, or the buffer is filled, the driver will return to the caller with the A-REG set to the input count.

3-17. LINE PRINTER OUTPUT

The same rules apply as for the Console Output driver except:

- a. The JSB is JSB 103B,I.
- b. A halt 106076 will occur if the line printer is not ready.

DIAGNOSTIC SERIAL NUMBERS

APPENDIX

A

Major groups are listed first (these are the prefixes for the DSN's). Specific DSN's follow this listing.

DSN	DIAGNOSTIC GROUP
000RXX	Control Programs
100RXX	Reserved
101RXX	CPU
102RXX	Memory
103RXX	Interface Cards
104RXX	Consoles
105RXX	Line Printers
106RXX	Tape Readers/Punches
107RXX	Plotters
110RXX	Reserved
111RXX	Discs
112RXX	Mag Tapes
113RXX	Card Readers
114RXX	Reserved
116RXX	Reserved
117RXX	Special Peripherals
177777	Prereleased program

Notes: See figure 3-3 in paragraph 3-2 for explanations.
R = revision.

All one's in the DSN represents a prereleased diagnostic or control program.

A diagnostic reference table is presented in table A-1, which lists the DSN's, diagnostic designations, part numbers, and date codes for the HP 2100 Series diagnostic media and the appropriate diagnostic reference manuals used with this Configurator.

24396A-F Products Cross Reference List

PRODUCT NO.	NAME	PARTS SUPPLIED WITH PRODUCT	
		SOFTWARE	MANUALS
24396A	CPU AND MEMORY DIAGNOSTICS ON PAPER TAPES	24296-60001 24396-12001 24396-12002 24396-12003	24396-14001
24396B	DIAGNOSTIC LIBRARY ON 7900/01 CARTRIDGE DISC	24396-13001	24396-14001 24396-14002
24396C	DIAGNOSTIC LIBRARY ON 7905 CARTRIDGE DISC	24396-13101	
24396D	DIAGNOSTIC LIBRARY ON 7970B MAGNETIC TAPE (800 BPI)	24396-13501	
24396E	DIAGNOSTIC LIBRARY ON 7970E MAGNETIC TAPE (1600 BPI)	24396-13601	24396-14003 24396-14004
24396F	DIAGNOSTIC LIBRARY ON 2644/45 MINICARTRIDGES	24396-13301 24396-13302 24396-13303 24396-13304 24396-13305 24396-13306 24396-13307 24396-13308 24396-13309 24396-13310	24396-14001 24396-14002 24396-14003 24396-14004

*The diagnostics and control programs listed in this reference table are stored on the appropriate media in the sequence specified by the table. This does not imply that a specific system delivered to a user is compatible with all the hardware listed in this table.

Table A-1. Diagnostic Reference Table for HP 24396A-F Products

DSN	DESIGNATION	REQ MEM SIZ	SINGLE FILE PAPER TAPE			MULTIPLE FILES						MANUAL VOL.															
			BINARY	D.C.	MANUAL	PAPER TAPE		2644/45 CARTRIDGE		DISC/MAG TAPE																	
						BINARIES	D.C.	BINARIES	D.C.	BINARIES	D.C.																
000200	DIAGNOSTIC CONFIGURATOR	4K	24296-60001	1627	02100-90157	24296-60001	1627	THE DIAGNOSTIC CONFIGURATOR IS THE FIRST FILE ON EVERY CARTRIDGE TAPE, DISC AND MAG TAPE.																			
101100	MEMORY REFERENCE INSTRUCTION GROUP	4K	24315-16001	1624	02100-90218	24396-12001	1644	24396-13301	1802	24396-13302	1728	24396-14001															
101001	ALTER SKIP INSTRUCTION GROUP	4K	24316-16001	1431	02100-90211																						
101002	SHIFT ROTATE INSTRUCTION GROUP	4K	24317-16001	1431	02100-90212																						
102200	CORE MEMORY (2100/16/15/14)	4K	24323-16001	1624	02100-90219																						
102104	SEMICONDUCTOR MEMORY (21MX)	4K	24395-16001	1644	24395-90001																						
101004	EAU INSTRUCTION GROUP	4K	24319-16001	1431	02100-90214	24396-12002	1710																				
101207	FLOATING POINT INSTRUCTION GROUP	4K	24320-16001	1551	24320-90001																						
102001	MEMORY PROTECT (2116/15/14)	4K	24324-16001	1431	02100-90220																						
102002	MEMORY PARITY CHECK (2116/15/14)	4K	24325-16001	1431	02100-90221																						
102305	MEM PROT/PARITY ERROR (2100/21MX)	4K	12892-16001	1705	12892-90005																						
101206	POWER FAIL AUTO RESTART	4K	24321-16001	1635	02100-90216	24396-12003	1802																				
101003	INPUT OUTPUT INSTRUCTION GROUP	4K	24318-16001	1431	02100-90213																						
143200	GENERAL PURPOSE REGISTER	4K	24391-16001	1802	24391-90001																						
101105	DIRECT MEMORY ACCESS (2114/15/16)	4K	24322-16001	1502	02100-90217																						
101220	DIRECT MEMORY ACCESS (2100/21MX)	4K	24322-16002	1705	24322-90002																						
101011	EXT. INSTR. GROUP (INDEX)	4K	12943-16002	1432	12943-90004	24396-13302	1728				24396-13303		1728	24396-13304	1805	24396-14002											
101112	EXT. INSTR. GROUP (WORD,BYTE,BIT)	4K	12943-16001	1728	12943-90004																						
101110	2100 FAST FORTRAN PACKAGE	4K	12907-16003	1632	12907-90003																						
101113	21MX FAST FORTRAN PACKAGE 1	4K	12977-16004	1632	12977-90002																						
101114	21MX FAST FORTRAN PACKAGE 2	4K	12977-16005	1632	12977-90002																						
101016	2000 ACCESS COM PROCESSOR F.2100	8K	13206-16001	1526	13206-90003																						
101217	2000 ACCESS COM PROCESSOR F.21MX	8K	13207-16001	1728	13207-90003																						
102003	MEMORY EXPANSION UNIT	16K	12929-16001	1506	12929-90003																						
102006	SEMICOND MEMORY, MICROCODED F.21MX	4K	24395-16002	1644	24395-90003																						
103201	TIME BASE GENERATOR	4K	12539-16001	1706	12539-90011												24396-13303	1728	7900 DISC: 24396-13001 1805	7905 DISC: 24396-13101 1805	7970B MAG TAPE: 24396-13501 1805	7970E MAG TAPE: 24396-13601 1805	24396-14003				
143020	I/O CHANNEL OR 12979 EXTENDER	4K	12979-16001	1436	12979-90010																						
103115	12936 PRIVILEGED INTERRUPT	4K	12936-16001	1643	12936-90003																						
103105	12908/12978 WCS 256 W.	4K	12908-16001	1502	12908-90013																						
103023	13197 WCS 1024 W.	4K	13197-16002	1640	13197-90002																						
103207	12889 HARDWIRED SERIAL INTERFACE	4K	24335-16001	1717	02100-90169																						
103122	59310 INTERF. BUS INTERFACE	4K	59310-16001	1728	59310-90061																						
103003	12587 ASYN. DATA SET INTERF.	8K	12587-16001	1552	12587-90013																						
103110	12920 ASYN. MULTIPLEXER (DATA)	4K	12920-16001	1805	12920-90009																						
103011	12920 ASYN. MULTIPLEXER (CNTL)	4K	12920-16002	1444	12920-90009	24396-13304	1805								7970E MAG TAPE: 24396-13601 1805												24396-14003
103012	12621 SYNC. DATA SET (RECEIVE)	4K	12621-16001	1532	12621-90008																						
103013	12622 SYNC. DATA SET (SEND)	4K	12622-16001	1532	12622-90008																						
103116	12967 SYNC. INTERFACE	4K	12967-16001	1438	12967-90001																						
103017	12966 ASYN. DATA SET	8K	12966-16001	1519	12966-90004																						
103121	12968 ASYN. COMM. INTERFACE	4K	12968-16001	1602	12968-90003																						
104000	2600 KEYBOARD DISPLAY TERMINAL	4K	24200-16002	1615	24200-90002												24396-13305	1628					24396-14003				
104003	TELEPRINTER	4K	12531-16001	1509	12531-90042																						
144105	2762A/B TERMINAL (TERMINET)	8K	02762-16001	1546	02762-90035																						
104007	2615 VIDEO TERMINAL	4K	24351-16001	1347	02615-90002																						
104011	2640 INTERACTIVE TERMINAL	8K	02640-16001	1502	02640-90020	24396-13306	1643																				24396-14004
104012	2644 MINI DATA STATION (NON CTU)	8K	02644-16001	1542	02644-90012																						
104013	2644 MINI DATA STATION (CTU ONLY)	8K	02644-16002	1542	02644-90012																						
104017	92900 TERMINAL SUBSYS (3070,40280)	8K	92900-16001	1643	92900-90003																						
105000	2610/14 LINE PRINTER	4K	24366-16001	1451	24366-90001												24396-13307	1748					24396-14004				
105101	2767 LINE PRINTER	4K	12984-16001	1611	12984-90005																						
105102	2607 LINE PRINTER	4K	24340-16001	1446	12987-90004																						
145103	2613/17/18 LINE PRINTER	4K	02618-16001	1633	02618-90006																						
105006	2631 PRINTER	8K	02631-16001	1748	02631-90906																						
105007	2635 PRINTING TERMINAL	8K	02635-16001	1748	02635-90906																						
105104	9866 LINE PRINTER	4K	12996-16001	1541	12996-90001																						
112100	9-TRACK MAG TAPE (7970, 13181/3)	8K	13181-16001	1629	13181-90095																						
112102	7/9 TRACK MAG TAPE (13184 INTF)	8K	13184-16001	1629	13184-90008																						
111001	DISC FILE (2883)	8K	12965-16001	1451	12965-90009	24396-13308	1805																				24396-14004
111104	12732 FLEXIBLE DISC SUBSYSTEM	8K	12732-16003	1708	12732-90003																						
151302	7900/01 CARTRIDGE DISC	8K	12960-16001	1805	12960-90003																						
151403	7905/06/20/25 DISC	16K	12962-16001	1805	12962-90001																						
146200	PAPER TAPE READER-PUNCH	4K	12597-16001	1725	12597-90031												24396-13309	1725					24396-14004				
107000	DIG. PLOTTER INTERFACE (CALCOMP)	4K	12560-16001	1540	12560-90029																						
113100	2892 CARD READER	4K	12924-16001	1537	12924-90006																						
113001	2894 CARD READER PUNCH	8K	12989-16001	1614	12989-90001																						
113003	7261 CARD READER	4K	07261-16005	1546	07261-90005	24396-13310	1628																				24396-14004
010000	DIAGNOSTIC CROSS LINK	4K	24296-16003	1627	02100-90157																						
011000	7900/05/20 DISC INITIALIZATION	4K	24296-16002	1627	02100-90157																						

Table A-2. Diagnostic Reference Table for Part no. 24998-14002

DSN	DESIGNATION*	REQ MEM SIZ	SINGLE FILE PAPER TAPE			MULTIPLE FILES	
			BINARY	D.C.	MANUAL	2645 CARTRIDGE BINARIES	D.C.
000200	DIAGNOSTIC CONFIGURATOR	4K	24296-60001	1627	02100-90157	THE DIAGNOSTIC CONFIGURATOR IS THE FIRST FILE ON EVERY CARTRIDGE TAPE.	
101100	MEMORY REFERENCE INSTRUCTION GROUP	4K	24315-16001	1624	02100-90218	24998-13301	1802
101001	ALTER SKIP INSTRUCTION GROUP	4K	24316-16001	1431	02100-90211		
101002	SHIFT ROTATE INSTRUCTION GROUP	4K	24317-16001	1431	02100-90212		
102104	SEMICONDUCTOR MEMORY (21MX)	4K	24395-16001	1644	24395-90001		
101004	EAU INSTRUCTION GROUP	4K	24319-16001	1431	02100-90214		
101207	FLOATING POINT INSTRUCTION GROUP	4K	24320-16001	1551	24320-90001		
102305	MEM PROT/PARITY ERROR (2100/21MX)	4K	12892-16001	1705	12892-90005		
101206	POWER FAIL AUTO RESTART	4K	24321-16001	1635	02100-90216		
101003	INPUT OUTPUT INSTRUCTION GROUP	4K	24318-16001	1431	02100-90213		
143200	GENERAL PURPOSE REGISTER	4K	24391-16001	1802	24391-90001		
101220	DIRECT MEMORY ACCESS (2100/21MX)	4K	24322-16002	1705	24322-90002		
101011	EXT. INSTR. GROUP (INDEX)	4K	12943-16002	1432	12943-90004		
101112	EXT. INSTR. GROUP (WORD,BYTE,BIT)	4K	12943-16001	1728	12943-90004		
101113	21MX FAST FORTRAN PACKAGE 1	4K	12977-16004	1632	12977-90002	24998-13302	1728
101114	21MX FAST FORTRAN PACKAGE 2	4K	12977-16005	1632	12977-90002		
102003	MEMORY EXPANSION UNIT	16K	12979-16001	1506	12929-90003		
102006	SEMICOND MEMORY, MICROCODED F.21MX	4K	24395-16002	1644	24395-90003		
103201	TIME BASE GENERATOR	4K	12539-16001	1706	12539-90011		
143020	I/O CHANNEL OR 12979 EXTENDER	4K	12979-16001	1436	12979-90010		
103023	13197 WCS 1024 W.	4K	13197-16002	1640	13197-90002		
103207	12889 HARDWIRED SERIAL INTERFACE	4K	24335-16001	1717	02100-90169		
103122	59310 INTERF. BUS INTERFACE	4K	59310-16001	1728	59310-90061		
103110	12920 ASYN. MULTIPLEXER (DATA)	4K	12920-16001	1805	12920-90009	24998-13303	1805
103011	12920 ASYN. MULTIPLEXER (CNTL)	4K	12920-16002	1444	12920-90009		
103012	12621 SYNC. DATA SET (RECEIVE)	4K	12621-16001	1532	12621-90008		
103013	12622 SYNC. DATA SET (SEND)	4K	12622-16001	1532	12622-90008		
103116	12967 SYNC. INTERFACE	4K	12967-16001	1438	12967-90001		
103017	12966 ASYN. DATA SET	8K	12966-16001	1519	12966-90004		
104003	TELEPRINTER	4K	12531-16001	1509	12531-90042		
144105	2762A/B TERMINAL (TERMINET)	8K	02762-16001	1546	02762-90035		
104011	2640 INTERACTIVE TERMINAL	8K	02640-16001	1502	02640-90020		
104017	92900 TERMINAL SUBSYS (3070,40280)	8K	92900-16001	1643	92900-90003	24998-13304	1748
105102	2607 LINE PRINTER	4K	24340-16001	1446	12987-90004		
145103	2613/17/18 LINE PRINTER	4K	02618-16001	1633	02618-90006		
105006	2631 PRINTER	8K	02631-16001	1748	02631-90906		
105007	2635 PRINTING TERMINAL	8K	02635-16001	1748	02631-90906		
105104	9866 LINE PRINTER	4K	12996-16001	1541	12996-90001		
112100	9-TRACK MAG TAPE (7970, 13181/3)	8K	13181-16001	1629	13181-90095		
111104	12732 FLEXIBLE DISC SUBSYSTEM	8K	12732-16003	1708	12732-90003		
151302	7900/01 CARTRIDGE DISC	8K	12960-16001	1805	12960-90003	24998-13305	1805
151403	7905/06/20/25 DISC	16K	12962-16001	1805	12962-90001		
146200	PAPER TAPE READER-PUNCH	4K	12597-16001	1725	12597-90031		
113100	2892 CARD READER	4K	12924-16001	1537	12924-90006		
113003	7261 CARD READER	4K	07261-16005	1546	07261-90005		
010000	DIAGNOSTIC CROSS LINK	4K	24296-16003	1627	02100-90157		
011000	7900/05/20 DISC INITIALIZATION	4K	24296-16002	1627	02100-90157		

Note: Part no. 24998-14002 consists of the 5 cartridge tapes 24998-13301, 24998-13302, 24998-13303, 24998-13304, and 24998-13305 plus all manuals listed in the table.

*The diagnostics and control programs listed in this reference table are stored on the appropriate media in the sequence specified by the table. This does not imply that a specific system delivered to a user is compatible with all the hardware listed in this table.

CONFIGURATOR HALT CODE SUMMARY

APPENDIX

B

HALT CODE

REASON/RESPONSE

102000	Manual Configuration was selected (S-REG originally cleared). The program is requesting the computer type and options. The program calculated type and options are stored in the A-REG and S-REG (S-REG only if the computer being used is a HP 21MX, 2100A/S or 2114A/B). Refer to figure 3-4 and paragraph 3-4 and if necessary, change the S-REG to the correct, or desired value and press RUN.
102001	Manual Configuration was selected (S-REG originally cleared). The program is requesting the console interface type and select code. The A-REG and S-REG are cleared by the program prior to the halt. Refer to figure 2-6 for the correct bit setting, set the S-REG accordingly and press RUN. If no console device is available ensure that the S-REG is cleared and then press RUN.
102002	Manual Configuration was selected (S-REG originally cleared). The program is requesting the line printer type and select code. The A-REG and S-REG are cleared prior to the halt. Refer to figure 2-6 for the correct bit setting, set the S-REG accordingly and press RUN. If no line printer is available ensure that the S-REG is cleared then press RUN.
102003	Manual Configuration was selected (S-REG originally cleared). The program is requesting the memory size. The program calculated size is stored in the A-REG and S-REG (S-REG only if the computer being used is a 21MX, 2100A/S or 2114A/B). Refer to figure 3-5 and paragraph 3-4 and if necessary, change the S-REG to correct, or desired value then press RUN.
102004	Manual Configuration was selected (S-REG originally cleared). The program is requesting the diagnostic input device type and select code. The A-REG and S-REG are cleared by the program prior to the halt. Refer to figure 2-6 for the correct bit setting, set the S-REG accordingly then press RUN.
102010	Illegal select code (<10) for diagnostic input device or console was chosen. Restart at P = 100 for configuration or P = 2 for Pretest. (If halt occurs during disc initialization, there was no console specified and program cannot be run.)

HALT CODE	REASON/RESPONSE
102011	Checksum error during the loading of a binary file.
102020	Pretest halt for 2115 or 2116 computer. Set S-REG to 177777 and press RUN.
102021	Pretest halt for 2115 or 2116 computer. Clear S-REG and press RUN.
102022	Conversational or Automatic Configuration was selected and the console interface type could not be determined by the configurator from the select code input to the S-REG. Check the S-REG for the correct select code: - Change it if incorrect, then press RUN. - If the select code is correct check the interface type. If it is not a 12531, 12880, 12587, 12966 or 12968, no driver is available and no console can be specified. - If the select code and type are correct there is a possible problem on the interface board and the Manual Configuration must be used. The diagnostic for the console or interface should be run.
102033	The disc boot has been loaded and executed. During execution the boot could not find the DMA/DCPC control word in upper memory (for the select code). Load A-REG bits 5-0 with the disc select code and press RUN.
102044	Disc did not respond with a flag. Restart program.
102045	Disc not ready or a hardware failure has occurred. Press RUN to try operation again.
102055	Address violation during the loading of a binary file.
102066	Pretest failed. Refer to M-REG for memory location in Pretest and appendix D for program listing.
102071	Manual Configuration was selected (S-REG originally cleared) and the console type input by the operator was not valid. - To leave a pseudo-driver in place, press RUN or - Restart configuration.
102072	An invalid loader type has been specified during configuration. - Press RUN to leave a pseudo-loader in the driver area or - Restart configuration.

HALT CODE

REASON/RESPONSE

102077	End-of-operation. - Disc Boot. - Disc Initialization. - Paper Tape Dump. - Load Complete. - Configuration Complete (Manual). - Pretest Complete.
106070	"End-of-Files" was reached during a diagnostic load operation. The specified DSN was not found. If a different diagnostic(s) selection on the current tape is desired: - Load the A-REG with a new DSN. - Clear the B-REG if sequential execution is not desired, otherwise set B-REG to appropriate sequential selection. - Ready input device, set P-REG = 120, press PRESET and RUN. If the diagnostic(s) originally selected is on a different tape: - Load the new tape. (If a 2644/45 cartridge tape, manually file forward over the configurator.) - If sequential execution was selected ($B \neq 0$) set P-REG = N6500. - Ready input device, press PRESET and RUN.
106071*	No console was specified during configuration. A pseudo-driver was configured in place of the console driver and a request for input from the console was generated by the diagnostic. Press RUN to return to the program — but it should be noted that the request is in error. The program should check for the presence of a console (address 114 = SC of the console) before making a request.
106072*	No diagnostic input device was specified during Manual or Automatic configuration. A pseudo-driver was configured in place of the diagnostic input device driver and a request for input was generated by the diagnostic or the operator. No loading is possible.

HALT CODE**REASON/RESPONSE**

106073*	This halt has two meanings as follows: - During a transfer using the I/O processor loader link, an error was encountered. Restart the loader program in the I/O processor. - The diagnostic memory size exceeded the available space. (Refer to paragraph 2-10c.)
106074*	Error on diagnostic input device (paper tape, magnetic tape, cartridge tape, or disc): - Device not ready; ready device: Press RUN. - Time-out on long paper tape leader: Press RUN. - Incorrect SC or device type specified: Reconfigure Configurator. - Data error on device: Restart loader in Configurator by setting P = 120, A-REG to DSN, and B-REG to serial execution.
106075*	All unused memory locations in the first 4K are loaded with halts 106075.
106076*	An output request to the line printer has been generated and the line printer was not ready. Ready the line printer and press RUN.
106077*	Trap cell halt. M-REG = trap cell address.

*These halts can occur during diagnostic execution.

OPERATOR'S NOTES

APPENDIX

C

C-1. GENERAL

Appendix C is divided into four basic sections:

1. Figure C-1 gives the operator the basic instructions to transfer the Configurator and diagnostic(s) and/or control programs from one medium to another. It is a general guide to lead the user to the appropriate area in this manual (in case of paper tape dump or disc initialization), or to an operating system.
2. Magnetic tape and cartridge tape format required by basic loader and loader in Configurator.
3. Cartridge Disc Initialization for HP 7900/7901, HP 7905 and HP 7920.
4. Cross Link for program down-loading from a second computer in a multicomputer system.

LOAD CONFIGURATOR, DIAGNOSTIC(S), AND/OR CONTROL PROGRAM(S) FROM:	IF IT IS DESIRED TO TRANSFER THE CONFIGURATOR, DIAGNOSTIC(S), AND/OR CONTROL PROGRAMS TO:		
	PAPER TAPE	7970 MAG TAPE (9-TRACK) OR 2644/45 CARTRIDGE TAPE	7900/01 DISC 7905 DISC
Paper tape	Use Paper Tape Dump routine in Configurator; load Configurator and diagnostic from paper tape and create a memory dump of: a. Configured Configurator. — or — b. Configured Configurator and unconfigured diagnostic. — or — c. Configured Configurator and configured diagnostic.	Not possible with Configurator. Use DOS or RTE to transfer the absolute binary diagnostics onto magnetic tape or RTE to transfer the binary onto cartridge tape.	Use Disc Initialization Program to create a diagnostic disc with Configurator, desired diagnostic(s), and/or control program(s).
7970 Magnetic Tape (9-track) or 2644/45 Cartridge Tape.	Not possible with Configurator. Use DOS or RTE System for magnetic tape; use RTE System for cartridge tape.		
7900/01 Disc 7905 Disc 7920 Disc	Not possible due to special disc format.		

Figure C-1. Program Transfer Guide

C-2. MAGNETIC TAPE AND CARTRIDGE TAPE FORMAT

To facilitate the use of magnetic tape and cartridge tape, input drivers were added to the Configurator. This allows the operator to boot-in the Configurator, then load diagnostics using the Configurator driver. The Configurator, diagnostics, and control programs are in absolute binary format and the last file is followed by a second EOF record. To create a magnetic tape, the operator must use RTE or DOS to write the absolute binary programs onto magnetic tape. To create a cartridge tape, the operator must use RTE. Refer to figure C-2 for the format used on magnetic tape and cartridge tape.

C-3. CARTRIDGE DISC INITIALIZATION

C-4. GENERAL

The Cartridge Disc Initialization program is used to write first the Configurator, then Diagnostics and/or Control Programs on an HP 7900/1, HP 7905, or HP 7920 Cartridge Disc. After the Cartridge Disc has been initialized, the operator uses the Disc Loader (IBL or BMDL) to load the Configurator, then the Configurator is configured and used to load programs specified by a DSN from the disc.

The Disc Initialization program allows either the Configurator, diagnostics, and control programs to be coresident on a disc with an RTE or DOS operating system or have a disc entirely dedicated to diagnostic programs. When using the Disc Loader, the operator can specify via S-Register bit 3 to load either the Configurator (bit 3 set) or the system boot (bit 3 cleared), provided a system was on the disc prior to initialization. Disc Initialization requires continuous tracks on the disc. Track sparing is not employed by Disc Initialization. If diagnostics are coresident with a system, the system cannot do track sparing in the area where the diagnostic will be stored.

C-5. REQUIRED HARDWARE

The following hardware is required:

- a. An HP 2100 series computer with at least 4K of memory.
- b. An HP 7900/1, HP 7905, or HP 7920 Cartridge Disc. (Only computer type and cartridge disc type combinations specified by the appropriate hardware manuals are allowed to run Disc Initialization. The disc platter must be formatted and track sparing cannot be used. It cannot be the same physical disc as specified in paragraph C-5d.)

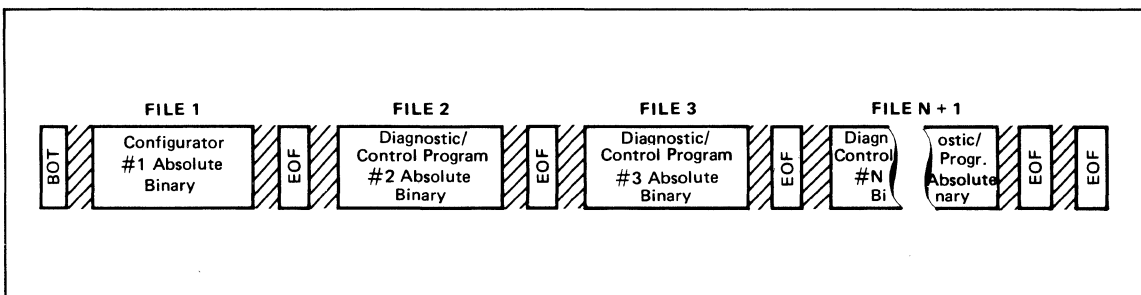


Figure C-2. Magnetic Tape and Cartridge Tape Format

- c. A console device for operator communication is required. The interface must be an HP 12531B/C/D, 12880A, 12587B, 12966A, or 12968A.
- d. A program input device as specified in paragraph 1-2d.

C-6. REQUIRED SOFTWARE

In addition to the Configurator and the programs to be loaded onto the disc, the Disc Initialization, part no. 24296-16002 is required.

C-7. OPERATING PROCEDURE

The operating procedures for Disc Initialization are outlined in figure C-3.

When the Disc Initialization program is executed it reads into memory cylinder 0, head 0, sector 0 where the system boot is located if the disc carries an operating system. It then copies data necessary for DOS IIIB, only that it saves the data so that the boot will operate with DOS IIIB.

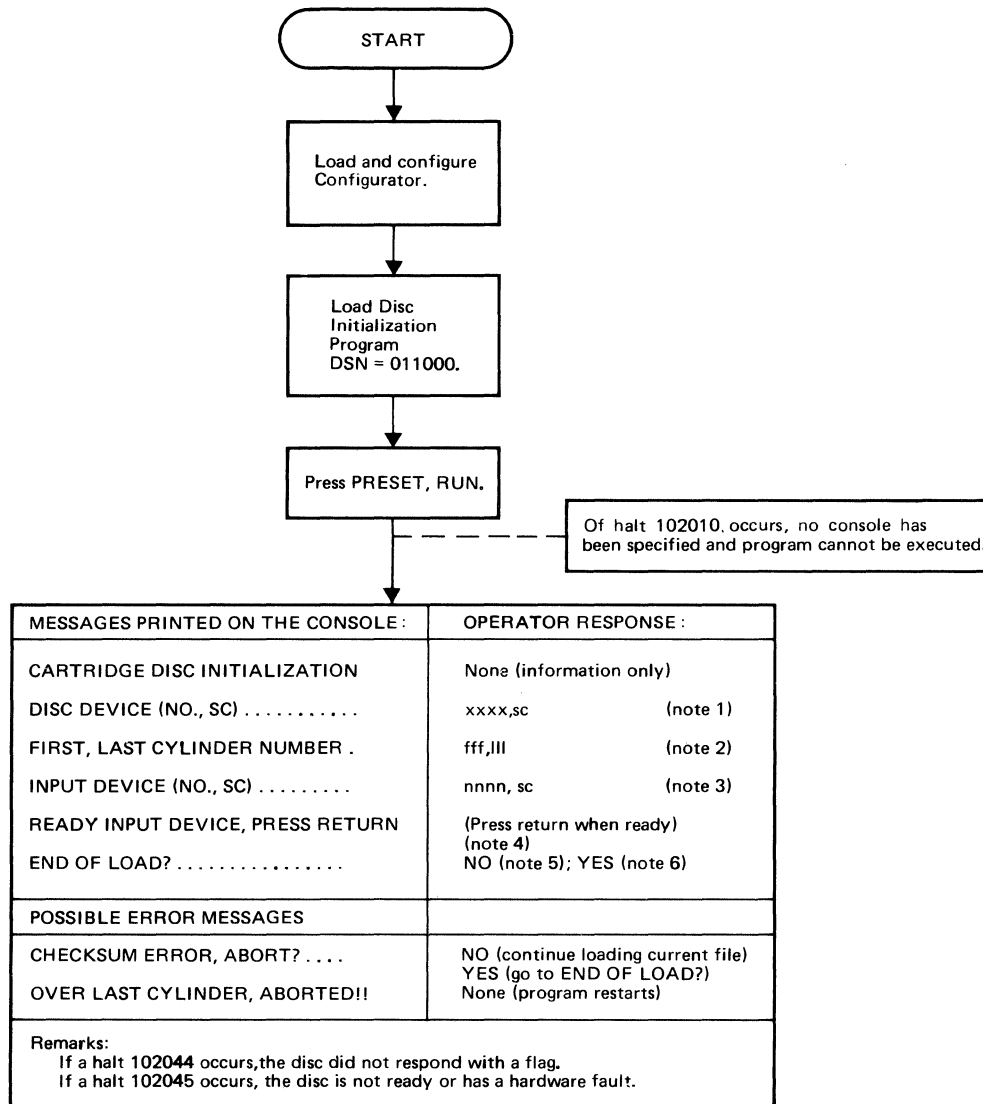
After the Configurator has been loaded and configured, and the Disc Initialization has been loaded with the help of the Configurator, the program (when executed) writes a title message and asks the operator to input the disc device type and SC followed by the first and last cylinder number. The numbers entered are first checked to ensure that the first cylinder number is smaller than the second and that the second cylinder number is not greater than 202 for 7900/1 or 410 for 7905/20. If either of the above conditions exists, the question is repeated. The Configurator loader routine is then written on the disc in the first cylinder specified by the operator. If the boot on the disc is not the original system boot but a previous Configurator boot, the program reads the original system boot from its previous location. The system boot is then written on the disc in the same cylinder as the loading routine.

The operator is then asked for the input device to be used. When the device is ready, the routine copies all files from the input device to the disc. The files must contain records of 60 words or less and be in absolute binary format. The files are stored consecutively until all files have been copied from the input device. At this point the operator is asked "END OF FILES?". If more files are to be loaded from the same input device, the operator answers "NO". If the entire file loading process is completed, the disc is ready to be employed as a diagnostic input device and the operator answers "YES" to terminate the disc initialization. If "RUN" is pressed after halt 102077, the program will restart.

C-8. CARTRIDGE DISC FORMAT

The first cylinder specified by the operator contains the original system boot and the Configurator loading routine. These are memory image formats. The Configurator (which must be loaded first), diagnostics, and/or control programs start on the next sequential cylinder and are in absolute binary format with the exception of the first three words. Each file starts on a sector boundary and the first three words contain the following:

- a. Word 1 = the cylinder number of the next consecutive file.
- b. Word 2 = the head and the sector of the next consecutive file.
- c. Word 3 = the highest memory address location used by the file.



- NOTES:
1. Respond with appropriate disc model number and lower SC (higher priority). XXXX = 7900, 7901, or 7905.
 2. Respond with cylinder number on disc to be used for program storage.
 3. Respond with the appropriate device number (or two letters) and select code.

nnn	= 2737, 2748 or 2758	Paper tape devices
	= 7970	Mag tape (9 - track only, Unit 0 only)
	= 7900 or 7901	Cartridge disc (removable platter only)
	= 7905	Cartridge disc (removable platter, upper surface)
	= 7920	Cartridge disc (upper surface)
	= 2644 or 2645	Cartridge tape
SC	= select code of device	(Lower SC in case of 2 SC)
 4. All binary files will be transferred from specified input device to disc until double end of files or end of tape is reached. The Configurator must be first file loaded.
 5. Respond with "NO" to continue loading more files from specified input device after input device has been readied.
 6. Respond with "YES" if end of load operation.

Figure C-3. Disc Initialization Flowchart

The last file is an end of files mark where:

- a. Word 1 = all one's.
- b. Word 2 = all zero's.
- c. Word 3 = all zero's.

C-9. DISC INITIALIZATION EXAMPLE

The system configuration is used for the following Disc Initialization example:

- a. HP 21MX Computer with DMA, MPRT, and 32K memory.
- b. Console in select code 12.
- c. Paper tape reader in select code 13.
- d. HP 7900A Disc in select code 15.
- e. HP 7970B Magnetic Tape Unit in select code 21.

Initialize a cartridge disc using magnetic tape as a source for the binary files. The cartridge disc can:

- a. Be blank (but must be formatted),
- b. Have a system on it with a reserved area set aside when the system was generated, or
- c. Have a system on it with an area set aside in the file area on disc. This area, once initialized, cannot be moved (example PK command). Therefore, it should be the first area in the directory. The area can be set aside by the ST,B command for DOS or the CR command for RTE. (A directory list will give the starting cylinder of the file.)

After the Disc Initialization program has been loaded by the Configurator and started at location 100, the following messages appear on the terminal:

```
CARTRIDGE DISC INITIALIZATION
DISC DEVICE (NO.,SC) . . . . . 7900,15
FIRST, LAST CYLINDER NUMBERS.0,40    (blank disc or the area set aside)
INPUT DEVICE (NO.,SC) . . 7970,21
READY INPUT DEVICE, PRESS RETURN
```

At this point the program loads the binary files sequentially from magnetic tape. When the transfer is complete, the program will output the message "END OF LOAD?". If more files are to be loaded from the same device, answer "NO". If all files are loaded and the cartridge is ready, answer "YES".

C-10. CROSS LINK

C-11. GENERAL

Cross Link is used in a multicomputer environment where one computer is designated as a central processor and all others are I/O (slave) processors. It is used to load the Configurator,

diagnostics, and control programs from the central processor to an I/O processor through one of three possible links:

- a. HP 12875 Processor Interconnect. (Four 12566 interfaces; Cross Link utilizes one 12566 processor interconnect pair.)
- b. HP 12665 Computer Serial Interface Kit.
- c. HP 12773 Computer Modem Interface Kit.

The two interface kits have the same program control. The differences are that the 12665 is hardwired and the 12773 is modem connected.

The program is useful when the I/O processor has one of the two links to the central processor but no input device and/or no console and/or no line printer attached, and a diagnostic has to be loaded and executed in the I/O processor. This does not imply that all three peripheral devices have to be attached to the central processor. However, when any one of the three devices are attached to the central processor, Cross Link must be loaded and execution started in the central processor so that the linkage for that device can be established to the I/O processor.

All drivers (input device, console, and line printer) which have been loaded as part of the Configurator will be configured to the peripherals in the central processor. The Cross Link program, which then is loaded, will link the drivers via link routines from the central processor to the I/O processor. This feature gives the user the capability to load a program (diagnostic) from the input device via the input device link in the main processor through the input device coupler driver in the I/O processor into the I/O processor memory. Then he starts program execution in the I/O processor. Message reporting to the console is done via the console coupler driver in the I/O processor, the console link and console driver in the central processor, and to the attached console. See figure C-4.

The Cross Link program does require the full dedication of the central processor because it is a standalone program. It is not possible to initialize a disc through Cross Link.

C-12. REQUIRED HARDWARE

The following hardware is required:

- a. Two or more 2100 series computers, each with at least 4K of memory.
- b. HP 12875 Processor Interconnect or HP 12665/12773 Computer Serial Interface. (Only computer type and Processor Interconnect combinations or computer type and Serial Interface combinations specified by the appropriate hardware manuals are allowed.)
- c. A console device for operator communication is optional. See paragraph 1-2c.
- d. A program input device as specified in paragraph 1-2d.

C-13. REQUIRED SOFTWARE

In addition to the Configurator and the programs to be cross-loaded to the I/O processor, the Diagnostic Cross Link, part no. 24296-16003, is required.

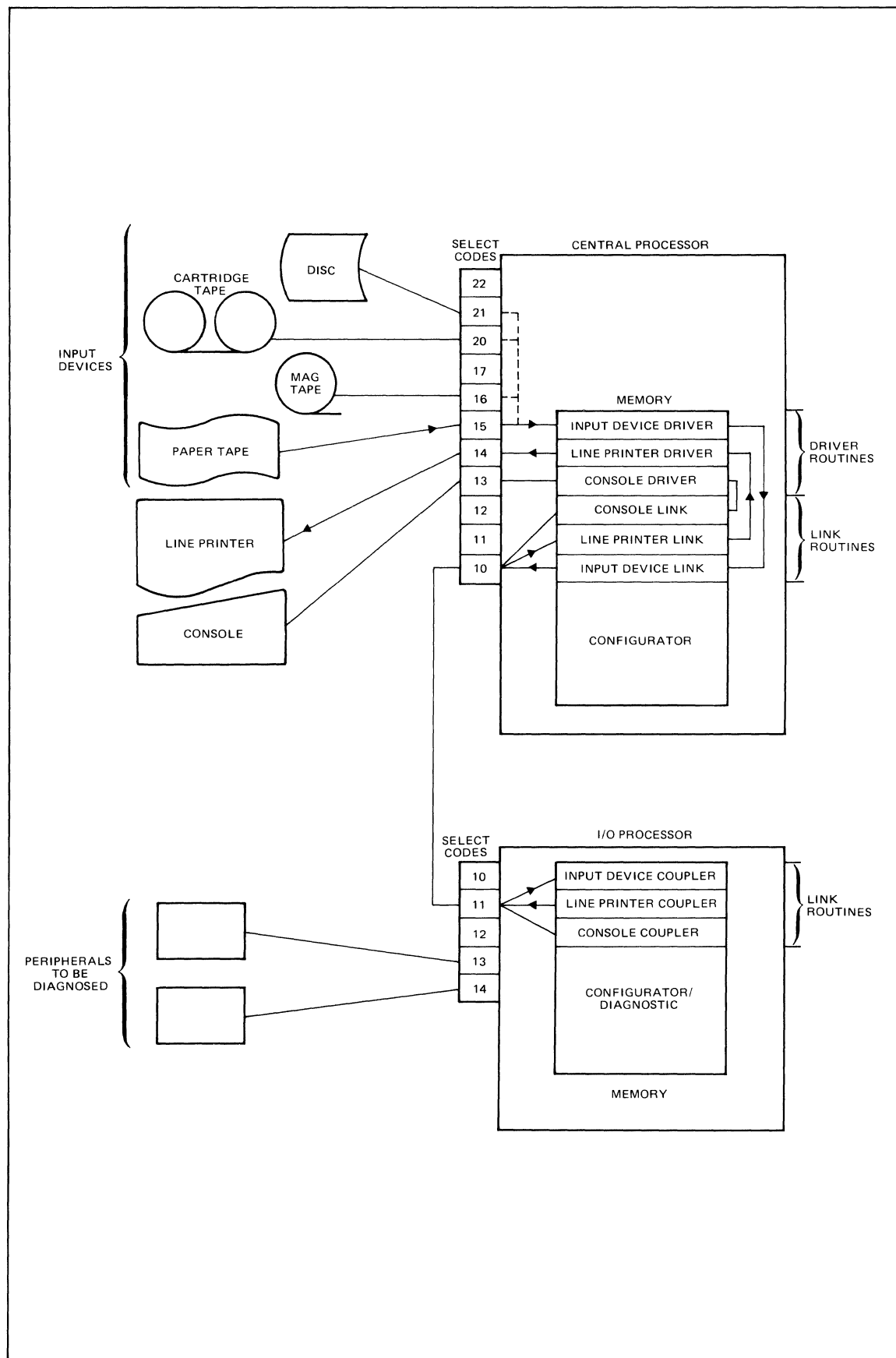
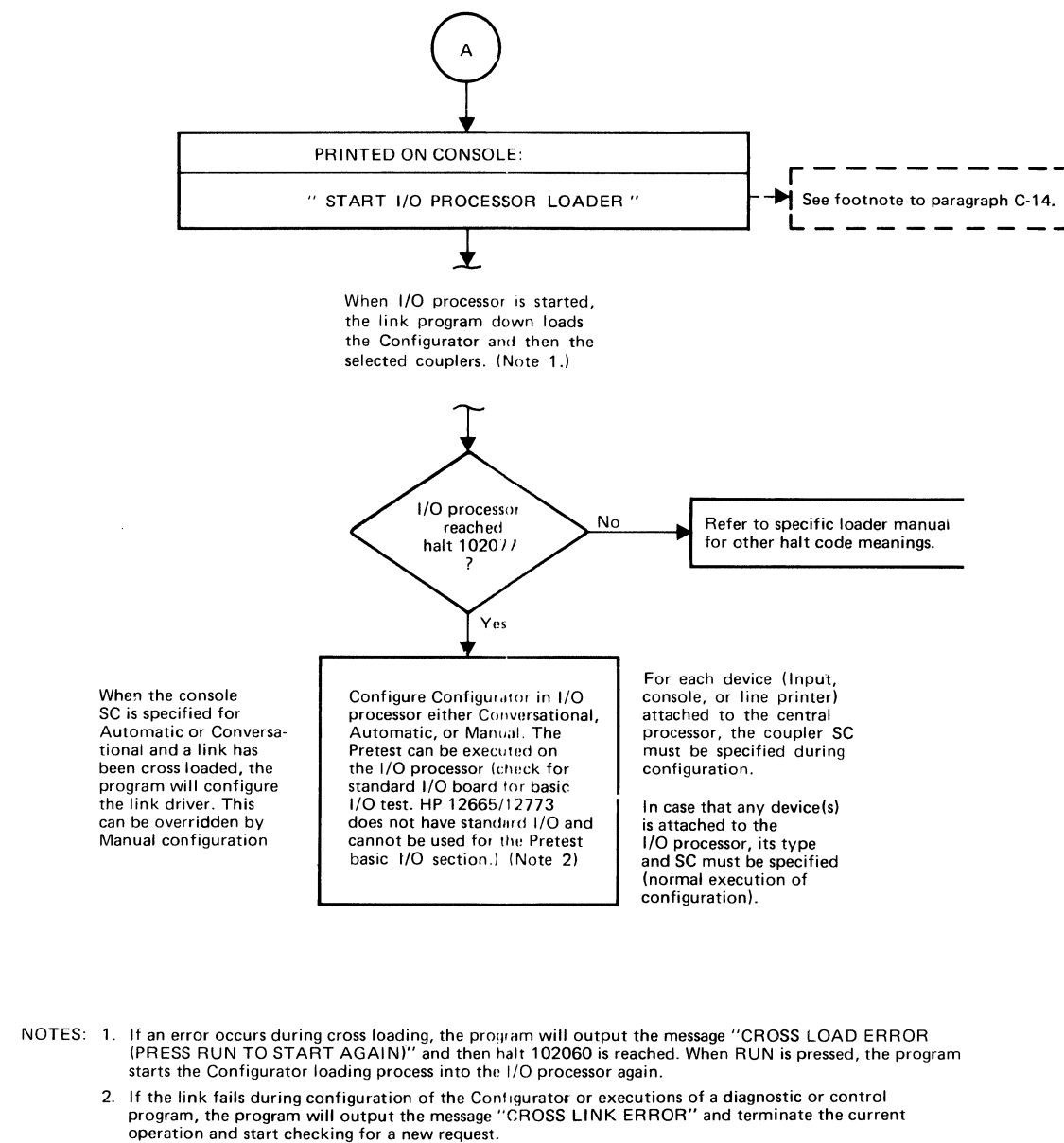
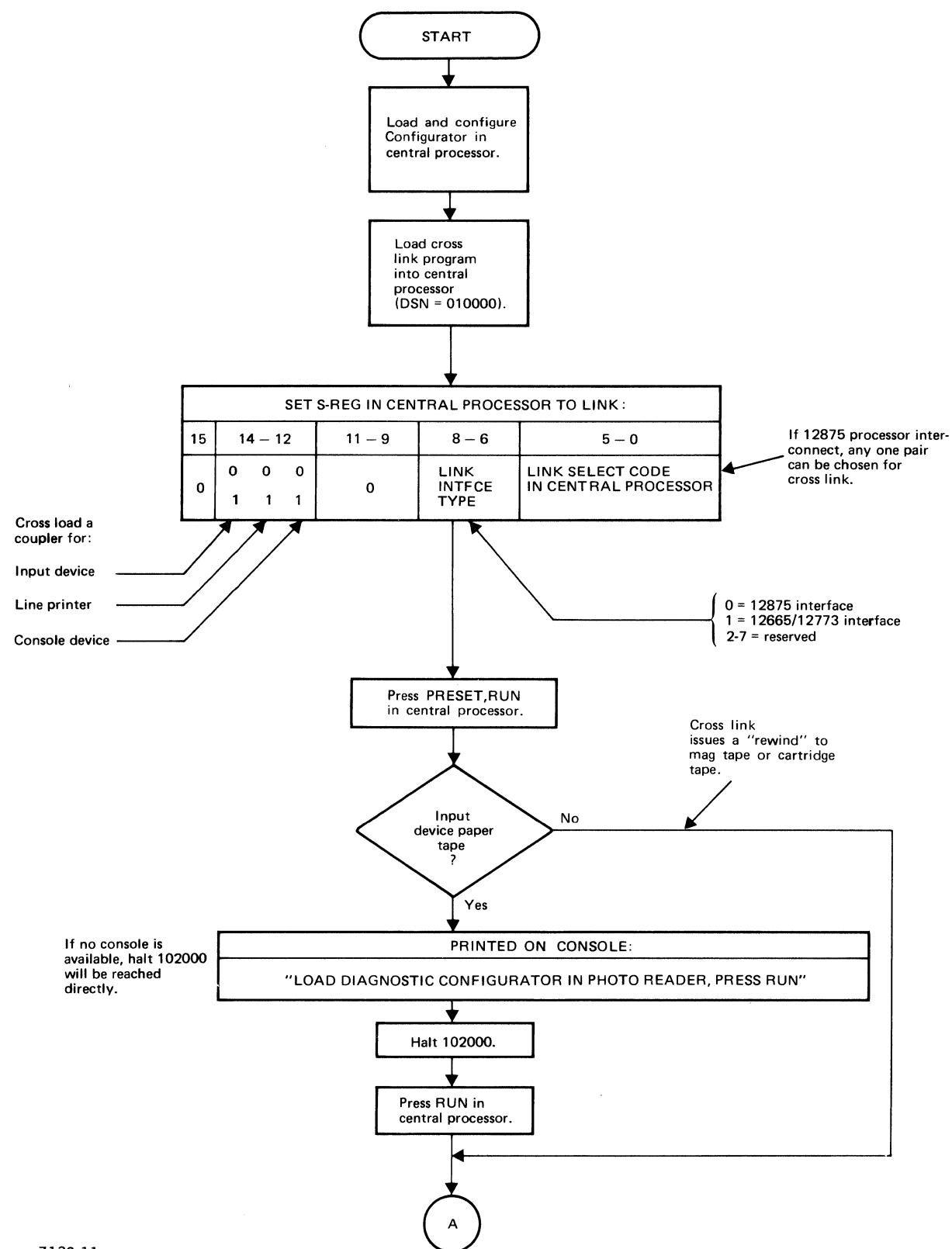


Figure C-4. Dual Computer Link

C-14. OPERATING PROCEDURES

The operating procedures for Cross Link are outlined in figure C-5. To execute the Cross Link program, the operator must first load and configure the Configurator in the central processor to the input device and/or console and/or line printer type and SC's, then load the Cross Link program with the Configurator. In S-Register bits 0-8, specify the link interface type and select codes and with S-Register bits 12-14, specify which drivers (input device, line printer, console) are to be used in the I/O processor. After pressing RUN on the central processor, the program instructs the operator to start the special binary loader* in the I/O processor to load the Configurator from the input device via the central processor to the I/O processor. When the Configurator is loaded, the Cross Link loads the couplers which were specified by the operator. It should be noted that the Cross Link program sets a flag in the I/O processor memory so that, when the Configurator in the I/O processor is configured, the program will use the console coupler (unless overridden by Manual Configuration). The input device coupler SC must be specified as the diagnostic input device during configuration of the Configurator. In case of a line printer, the first coupler SC must be specified.

*Special binary loader: for 12875 Processor Interconnect, standard Paper Tape Loader is employed to cross link.
for 12665/12773 Computer Interface Kit, SCE1 Loader Program, part no. 91700-16160 Rev. 1621, or equivalent ROM.



PRETEST SOURCE LISTING

APPENDIX

D

PAGE 0002 #01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0001          ASMR,A,B,L,C
0003 00002          ORG 2
0004          SLP
0005 00000          A      EQL 0
0006 00001          B      EQL 1
0007 00000          SC     EQL 0
0008 00000          INTP   EQL 0
0009 00001          SWREG  EQL 1
0010 00002          DMA2   EQL 2
0011 00006          DMA6   EQL 6
0012 00005          MPRT   EQL 5
0013 00002 024130    JMP 1300          GC TO START OF PRETEST
0014 00003 106077    OCT 106077
0015          REP 15
0016 00004 106077    OCT 106077,106077,106077,106077
0016 00010 106077    OCT 106077,106077,106077,106077
0016 00014 106077    OCT 106077,106077,106077,106077
0016 00020 106077    OCT 106077,106077,106077,106077
0016 00024 106077    OCT 106077,106077,106077,106077
0016 00030 106077    OCT 106077,106077,106077,106077
0016 00034 106077    OCT 106077,106077,106077,106077
0016 00040 106077    OCT 106077,106077,106077,106077
0016 00044 106077    OCT 106077,106077,106077,106077
0016 00050 106077    OCT 106077,106077,106077,106077
0016 00054 106077    OCT 106077,106077,106077,106077
0016 00060 106077    OCT 106077,106077,106077,106077
0016 00064 106077    OCT 106077,106077,106077,106077
0016 00070 106077    OCT 106077,106077,106077,106077
0016 00074 106077    OCT 106077,106077,106077,106077
0017*
0018*          LINK TABLE
0019*
0020 00100 125417    START JMP CFG,I          GC DIRECT TO CONFIGURATION
0021 00101 007431    CRI   DEF LCVR          DATA RECCRD INPUT
0022 00102 007327    CDD   DEF CNSLO        CCNSOLE OUTPUT DRIVER
0023 00103 007404    LPD   DEF LNPTR        LINE PRINTER DRIVER
0024 00104 007354    CIO   DEF CNSLI        CCNSOLE INPUT DRIVER
0025 00105 000130    FWA   OCT 130          FIRST WORD OF AVBL. MEMORY
0026 00106 006477    LWA   DEF LWAA          LAST WORD OF AVBL. MEMORY
0027 00107 007167    CLP   DEF LCAD          DIAG. LOADER PROGRAM
0028 00110 177404    DEC   -252             1 MILSEC. TIME COUNT
0029 00111 000000    DRISC OCT 0           DATA RECCRD INPUT SELECT CODE
0030 00112 000000    CODSC OCT 0           CCNSOLE OUTPUT SELECT CODE
0031 00113 000000    LPDSC OCT 0           LINE PRINTER SELECT CODE
0032 00114 000000    CIOSC OCT 0           CCNSOLE INPUT SELECT CODE
0033 00115 000000    CTO   NCP             COMPUTER TYPE/OPTIONS
0034 00116 000000    NCP   NCP             USER CARD TYPE AND SELECT CODE
0035 00117 000000    MEM   NCP             MEMORY SIZE
0036 00120 114107    JSR   DLP,I          GC TO DIAG. LOADER PROGRAM
0037 00121 006730    WAIT  DEF TMR          1 MILL SEC TIMER ROUTINE
0038 00122 006722    SWRC  DEF SWR          CHECK SWITCH REG
0039 00123 006610    C2AS  DEF C2ASC        DECIMAL TO ASCII CONVERSION
0040 00124 006566    C2AS  DEF C2ASC        CCTAL TO ASCII CONVERSION
0041 00125 006653    AS2N  DEF ASC2N        ASCII TO BINARY CONVERSION
0042 00126 000200    CSN   OCT 000200       CCNF. SERIAL NUMBER
0043 00127 006502    FMTC  DEF FMTR        FORMATTED OUTPUT

```

PAGE 0003 #01 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0045*   ONLY SINGLE OPERATION INSTRUCTIONS ARE TESTED.
0046*   IT IS ASSUMED THAT COMBINATIONS AFTER INITIAL
0047*   TEST WILL WORK (NOT NECESSARILY TRUE BUT NECESSARY).
0048*
0049*   INSTRUCTIONS ARE TESTED IN THE FOLLOWING SEQUENCE:
0050*
0051*   RSS  SOS  SOC  STC  CLO  CLE  SEZ  CCE  CME
0052*
0053*   CLA  CCA  CPA  SZA  STA  LDA  INA  CMA  SSA  SLA (B-REG INCLUSIVE)
0054*
0055*   STA B,I  STB A,I  LDA B,I  LDB A,I  CPA B,I  CPB A,I
0056*
0057*   JMP (BP) JSB (BP) JSB (BP),I TC (BP)
0058*
0059*   GENERAL MEMORY TEST (FIRST 4K ONLY)
0060*
0061*   AND  XOR  ICR  ISZ  ADA  ADB
0062*
0063*   MEMORY ADDRESS, PATTERN & WORST CASE TEST (ABOVE 4K ONLY)
0064*
0065*   CURRENT PAGE / BASE PAGE  JMP  LCA  STA  CPA  JSB
0066*
0067*   ALS  ARS  RAL  RAR  ALR  ALF  (BITS 0-6)
0068*
0069*   ALS  ARS  RAL  RAR  ALR  ALF  (BITS 2-0)
0070*
0071*   ELA  ERA  (BITS 0-6)  ELA  ERA  (BITS 2-0)
0072*
0073*
0074*   ANY ERROR ENCOUNTERED WILL BE INDICATED BY
0075*   A HALT 66B (102066)
0076*   00066   ERH   EGU 66B
0077*   REFER TO LISTING AT THE M-REG. ADDRESS FOR DETAILS IF
0078*   A HALT OCCURS.
0079*   FOR REFERENCES (BP) = BASE PAGE  AND (CP) = CURRENT PAGE

```

```

0081*   ARITHMETIC SETTING OF E & C REGISTERS (INA ADA  INB ADB)
0082*
0083*   EXTEND & OVERFLOW REGISTER RESULTS
0084*
0085*
0086*   AD* MEM  TO REG.  *   REG.  CVF  EXT
0087*   +      +      +      +      0    0
0088*   +      +      -      -      1    0
0089*   +      -      +      +      0    1
0090*   -      +      +      +      0    1
0091*   -      +      -      -      0    0
0092*   +      -      -      -      0    0
0093*   -      -      -      -      0    1
0094*   -      -      +      +      1    1

```

PAGE 0004 #01 DIAGNOSTIC CONFIGURATOR (CSN 002200)

```

0096*          PRE-TEST PART A (BP)
0097*
0098 00130 107700      CLC INTP,C      GENERATE CRS
0099 00131 002001      RSS
0100 00132 102066  HLT0  HLT ERH      RSS FAILED OR I/O CAUSED SKIP
0101*
0102 00133 071404      STA DISN      SAVE A-REG. FOR LATER
0103 00134 075405      STB DIBP      SAVE B-REG FOR LATER ALSO
0104 00135 002400      CLA
0105 00136 071406      STA SWRX      CLEAR S-REG. FLAG IF RESTART.
0106 00137 071407      STA BIOSC     CLEAR BASIC I/O SELECT CCCE
0107*
0108 00140 102101  PTL0  STO          START HERE IF PRE TEST LCCP
0109 00141 102201      SOC
0110 00142 102301      SCS
0111 00143 102066      HLT ERH      STC / SOC / SOS
0112 00144 103101      CLC
0113 00145 102301      SCS
0114 00146 102201      SOC
0115 00147 102066      HLT ERH      CLC / SCS / SOC
0116 00150 000040      CLE
0117 00151 002041      SEZ,RSS
0118 00152 002040      SEZ
0119 00153 102066      HLT ERH      CLE / SEZ,RSS / SEZ
0120 00154 002300      CCE
0121 00155 002040      SEZ
0122 00156 002041      SEZ,RSS
0123 00157 102066      HLT ERH      CCE / SEZ / SEZ,RSS
0124 00160 002200      CME
0125 00161 002041      SEZ,RSS
0126 00162 002040      SEZ
0127 00163 102066      HLT ERH      CME / SEZ / SEZ,RSS

```


PAGE 0005 #01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

		PRE-TEST PART A (BP)	
0129*			
0130*			
0131	00164 002400	CLA	
0132	00165 007400	CCB	
0133	00166 071376	STA TMPA	
0134	00167 075377	STB TMPB	
0135	00170 051335	CPA B0	
0136	00171 002002	SZA	
0137	00172 102066	HLT ERH	CLA/CPA/SZA
0138	00173 006002	SZB	
0139	00174 055335	CPB B0	
0140	00175 102066	HLT ERH	CCB/CPB/SZB
0141	00176 051366	CPA M1	
0142	00177 102066	HLT ERH	CPA
0143	00200 055335	CPB B0	
0144	00201 102066	HLT ERH	CPB
0145	00202 061377	LDA TMPB	
0146	00203 065376	LDB TMPA	
0147	00204 002002	SZA	
0148	00205 051335	CPA B0	
0149	00206 102066	HLT ERH	STB/LDA
0150	00207 055335	CPB B0	
0151	00210 006002	SZB	
0152	00211 102066	HLT ERH	STA/LDB
0153	00212 102301	SCS	
0154	00213 002040	SEZ	
0155	00214 102066	HLT ERH	E / C SET
0156	00215 006004	INB	
0157	00216 102301	SCS	
0158	00217 002040	SEZ	
0159	00220 102066	HLT ERH	E / O SET
0160	00221 002004	INA	
0161	00222 002040	SEZ	
0162	00223 102201	SOC	
0163	00224 102066	HLT ERH	E NCT SET / O SET
0164	00225 000040	CLE	
0165	00226 006002	SZB	
0166	00227 002002	SZA	
0167	00230 102066	HLT ERH	INA/INE
0168	00231 055336	CPB B1	
0169	00232 002001	RSS	
0170	00233 102066	HLT ERH	INE

PAGE 0006 #01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0172*          PRE-TEST PART A (BP)
0173*
0174 00234 003400 CCA
0175 00235 006400 CLB
0176 00236 071376 STA TMPA
0177 00237 075377 STB TMPB
0178 00240 051366 CPA M1
0179 00241 002003 SZA,RSS
0180 00242 102066 HLT ERH CCA/CPA/SZA,RSS
0181 00243 006003 SZB,RSS
0182 00244 055366 CPB M1
0183 00245 102066 HLT ERH CLB/CPB/SZB,RSS
0184 00246 051335 CPA B0
0185 00247 102066 HLT ERH CPA
0186 00250 055366 CPB M1
0187 00251 102066 HLT ERH CPB
0188 00252 061377 LDA TMPB
0189 00253 065376 LDB TMPA
0190 00254 002003 SZA,RSS
0191 00255 051366 CPA M1
0192 00256 102066 HLT ERH STB/LDA
0193 00257 055366 CPB M1
0194 00260 006003 SZB,RSS
0195 00261 102066 HLT ERH STA/LDB
0196 00262 102301 SCS
0197 00263 002040 SEZ
0198 00264 102066 HLT ERH E / C SET
0199 00265 002004 INA
0200 00266 102301 SCS
0201 00267 002040 SEZ
0202 00270 102066 HLT ERH E / C SET
0203 00271 006004 INB
0204 00272 002040 SEZ
0205 00273 102201 SCC
0206 00274 102066 HLT ERH E NOT SET / C SET
0207 00275 000040 CLE
0208 00276 006003 SZB,RSS
0209 00277 002003 SZA,RSS
0210 00300 102066 HLT ERH INA/INB
0211 00301 051336 CPA B1
0212 00302 002001 RSS
0213 00303 102066 HLT ERH INA

```

PAGE 0007 #01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

		PRE-TEST PART A (BP)	
0215*			
0216*			
0217	00304 061413	LDA ALT0	
0218	00305 065413	LDB ALT1	
0219	00306 071376	STA TMPA	
0220	00307 075377	STB TMPB	
0221	00310 051413	CPA ALT0	
0222	00311 002001	RSS	
0223	00312 102066	HLT ERH	LDA/CPA
0224	00313 055413	CPB ALT1	
0225	00314 002001	RSS	
0226	00315 102066	HLT ERH	LDB/CPB
0227	00316 061377	LCA TMPB	
0228	00317 065376	LDB TMPA	
0229	00320 051413	CPA ALT1	
0230	00321 002001	RSS	
0231	00322 102066	HLT ERH	LCA/STB
0232	00323 055413	CPB ALT0	
0233	00324 002001	RSS	
0234	00325 102066	HLT ERH	LDB/STA
0235	00326 002004	INA	
0236	00327 006004	INB	
0237	00330 051413	CPA ALT1A	
0238	00331 002001	RSS	
0239	00332 102066	HLT ERH	INA
0240	00333 055414	CPB ALT0A	
0241	00334 002001	RSS	
0242	00335 102066	HLT ERH	INB

PAGE 0008 #01 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0244*          PRE-TEST PART A (BP)
0245*
0246 00336 002400 CLA
0247 00337 007400 CCB
0248 00340 003000 CMA
0249 00341 007000 CMB
0250 00342 051366 CPA M1
0251 00343 006002 SZB
0252 00344 102066 HLT ERH CMA / CMB
0253 00345 002020 SSA
0254 00346 006020 SSB
0255 00347 102066 HLT ERH SSA / SSB
0256 00350 000010 SLA
0257 00351 004010 SLB
0258 00352 102066 HLT ERH SLA / SLB
0259 00353 003000 CMA
0260 00354 007000 CMB
0261 00355 055366 CPB M1
0262 00356 002002 SZA
0263 00357 102066 HLT ERH CMA / CMB
0264 00360 006020 SSB
0265 00361 002020 SSA
0266 00362 102066 HLT ERH SSA / SSB
0267 00363 004010 SLB
0268 00364 000010 SLA
0269 00365 102066 HLT ERH SLA / SLB
0270 00366 061413 LDA ALT0
0271 00367 065415 LDB ALT1
0272 00370 003000 CMA
0273 00371 007000 CMB
0274 00372 051415 CPA ALT1
0275 00373 002001 RSS
0276 00374 102066 HLT ERH CMA
0277 00375 055413 CPB ALT0
0278 00376 002001 RSS
0279 00377 102066 HLT ERH CMB

```

PAGE 0009 #01 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0281*                                PRE-TEST PART A (BF)
0282*
0283*      CHECK SWITCH REGISTER I/O
0284*
0285  00400 061406      LDA SWRX      CHECK IF SWREG HAS
0286  00401 002002      SZA          BEEN CHECK BEFORE
0287  00402 024452      JMP NXT00     YES SKIP CHECK
0288  00403 102501      LIA SWREG     GET AND
0289  00404 071406      STA SWRX      SAVE S-REG.
0290  00405 061413      LDA ALT0     TRY ALTERNATING PATTERNS
0291  00406 102601      OTA SWREG
0292  00407 102501      LIA SWREG
0293  00410 051406      CPA SWRX      STILL ORIGINAL?
0294  00411 061413      LDA ALT0     YES 2116/5 FORCE SKIP
0295  00412 051413      CPA ALT0
0296  00413 002001      RSS
0297  00414 102066      HLT ERH
0298  00415 061415      LDA ALT1     OTHER PATTERN
0299  00416 102601      OTA SWREG
0300  00417 102501      LIA SWREG
0301  00420 051406      CPA SWRX      STILL ORIGINAL?
0302  00421 061415      LDA ALT1     YES 2116/5 FORCE SKIP
0303  00422 051415      CPA ALT1
0304  00423 002001      RSS
0305  00424 102066      HLT ERH
0306  00425 003400      CCA          TRY OUTPLTING
0307  00426 102601      OTA SWREG     ALL ONE'S
0308  00427 102501      LIA SWREG     NOW GET IT BACK
0309  00430 051406      CPA SWRX      2115/2116?
0310  00431 024444      JMP **11     OPERATOR MUST SET S-REG.
0311  00432 102501      LIA SWREG     GET IT AGAIN
0312  00433 051366      CPA M1       DID IT ECHO THE 1'S?
0313  00434 002001      RSS
0314  00435 102066      HLT ERH      NO
0315  00436 002400      CLA          TRY OUTPLTING
0316  00437 102601      OTA SWREG     B0 IS
0317  00440 102501      LIA SWREG     GET IT BACK
0318  00441 002002      SZA          OK
0319  00442 102066      HLT ERH      NO
0320  00443 024452      JMP NXT00     YES
0321  00444 102020      HLT 20B      2115/2116 OPERATOR MUST SET S-REG.
0322  00445 102501      LIA SWREG     GET IT
0323  00446 051366      CPA M1       IS IT ALL ONES
0324  00447 002001      RSS
0325  00450 102066      HLT ERH      NO INFORM OPERATOR
0326  00451 102021      HLT 21B      OPERATOR MUST CLEAR S-REG.
0327  00452          NXT00 EQL *
0328  00452 102501      LIA SWREG     GET IT AGAIN
0329  00453 002002      SZA          DID IT ECHO THE 0'S
0330  00454 102066      HLT ERH      NO
0331  00455 102301      SCS
0332  00456 002040      SEZ
0333  00457 102066      HLT ERH      E 0 SET

```

PAGE 0010 *01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0335*
0336*
0337 00460 061431 LDA DTMPB
0338 00461 065430 LCB DTMPA
0339 00462 170001 STA B,I
0340 00463 174000 STB A,I
0341 00464 051376 CPA TMPA
0342 00465 002001 RSS
0343 00466 102066 HLT ERH STA B,I/STB A,I
0344 00467 055377 CPB TMPB
0345 00470 002001 RSS
0346 00471 102066 HLT ERH STA B,I/STB A,I
0347 00472 160001 LDA B,I
0348 00473 164000 LCB A,I
0349 00474 051376 CPA TMPA
0350 00475 002001 RSS
0351 00476 102066 HLT ERH LDA B,I
0352 00477 055377 CPB TMPB
0353 00500 002001 RSS
0354 00501 102066 HLT ERH LCB A,I
0355 00502 160000 LDA A,I
0356 00503 164001 LCB B,I
0357 00504 150001 CPA B,I
0358 00505 002001 RSS
0359 00506 102066 HLT ERH CPA B,I/LDA A,I
0360 00507 154000 CPB A,I
0361 00510 002001 RSS
0362 00511 102066 HLT ERH CPB A,I/LCB B,I

```

PAGE 0011 #01 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0364*          PRE-TEST PART A (BP)
0365*
0366 00512 024514      JMP **2
0367 00513 102066      HLT ERH          JMP (BF)
0368 00514 024520      JMP **4
0369 00515 102066      HLT ERH          JMP (BF)
0370 00516 024522      JMP **4
0371 00517 102066      HLT ERH          JMP (BF)
0372 00520 024516      JMP **2
0373 00521 102066      HLT ERH          JMP (BF)
0374*
0375 00522 002400      CLA
0376 00523 070531      STA JB0
0377 00524 070544      STA JB1
0378 00525 060132      LDA HLT0
0379 00526 064132      LCB HLT0
0380 00527 014531      JSB **2
0381 00530 102066      JBR0 HLT ERH          JSB (BF)
0382 00531 000000      JB0 NCP
0383 00532 060531      LDA **1
0384 00533 051434      CPA DJBR0
0385 00534 002001      RSS
0386 00535 102066      HLT ERH          JSB (BF) RETURN ADDRESS
0387 00536 060132      LDA HLT0
0388 00537 114541      JSB **2,I
0389 00540 102066      JBR1 HLT ERH          JSB (BF),I
0390 00541 000544      DEF **3
0391 00542 102066      HLT ERH          JSB (BF),I
0392 00543 102066      HLT ERH          JSB (BF),I
0393 00544 000000      JB1 NCP
0394 00545 060544      LDA **1
0395 00546 051435      CPA DJBR1
0396 00547 002001      RSS
0397 00550 102066      HLT ERH          JSB (BF),I RETURN ADDRESS

```

PAGE 0012 *01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0399*                                PRE-TEST PART A (BF)
0400*
0401*    GENERAL MEMORY TEST
0402*    COVERS 4K MEMORY (2 TO 7677)
0403*    EXCEPT THIS ROUTINE
0404*
0405  00551      GMTS  EGL  *
0406  00551 006400      CLB          START WITH ADDRESS
0407  00552 006004      INB
0408  00553 006004      INB          TWC
0409  00554 160001      L00  LDA B,I  GET CURRENT CONTENTS
0410  00555 150001      CPA B,I      DIC IT LOAD OK?
0411  00556 002001      RSS
0412  00557 102066      HLT ERH      NO FAILED ON LOAD
0413  00560 071376      STA TMPA     CK SAVE ORIGINAL CONTENTS
0414  00561 003400      CCA
0415  00562 170001      STA B,I      PUT ALL M1 IN LOCATION
0416  00563 150001      CPA B,I      DIC IT STORE?
0417  00564 002001      RSS
0418  00565 102066      HLT ERH      NO FAILED ON STORE
0419  00566 002400      CLA          PUT 0 IN LOCATION
0420  00567 170001      STA B,I
0421  00570 150001      CPA B,I      DIC IT STORE?
0422  00571 002001      RSS
0423  00572 102066      HLT ERH      NO FAILED ON STORE
0424  00573 061413      LDA ALT0     PUT ALTERNATING PATTERN IN LOCATION
0425  00574 170001      STA B,I
0426  00575 150001      CPA B,I      DIC IT STORE?
0427  00576 002001      RSS
0428  00577 102066      HLT ERH      NO
0429  00600 061415      LDA ALT1     TRY OPPOSITE PATTERN
0430  00601 170001      STA B,I
0431  00602 150001      CPA B,I      DIC IT STORE?
0432  00603 002001      RSS
0433  00604 102066      HLT ERH      NO
0434  00605 061376      LDA TMPA     RESTORE ORIGINAL CONTENTS
0435  00606 170001      STA B,I
0436  00607 150001      CPA B,I      DIC IT GO BACK?
0437  00610 002001      RSS
0438  00611 102066      HLT ERH      NO
0439  00612 006004      INB          MOVE TO NEXT LOCATION
0440  00613 055432      CPB GMTSA     GCT TO THIS PROGRAM
0441  00614 065433      LDB GMTEA     YES SKIP OVER THIS SECTION
0442  00615 055361      CPB B7700     CCNE THIS 4K?
0443  00616 002001      RSS
0444  00617 024554      JMP L00      NO DO NEXT LOCATION
0445  00620      GMTS  EGL  *

```


PAGE 0013 #01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

			PRE-TEST PART A (BF)	
0447*				
0448*				
0449	00620	003400	CCA	
0450	00621	011335	AND B0	
0451	00622	002002	SZA	
0452	00623	102066	HLT ERH	AND
0453	00624	061413	LCA ALT0	
0454	00625	011415	AND ALT1	
0455	00626	002002	SZA	
0456	00627	102066	HLT ERH	AND
0457	00630	061415	LCA ALT1	
0458	00631	011413	AND ALT0	
0459	00632	002002	SZA	
0460	00633	102066	HLT ERH	AND
0461	00634	003400	CCA	
0462	00635	011413	AND ALT0	
0463	00636	051413	CPA ALT0	
0464	00637	002001	RSS	
0465	00640	102066	HLT ERH	AND
0466	00641	003400	CCA	
0467	00642	011415	AND ALT1	
0468	00643	051415	CPA ALT1	
0469	00644	002001	RSS	
0470	00645	102066	HLT ERH	AND
0471*				
0472	00646	002400	CLA	
0473	00647	021335	XCR B0	
0474	00650	002002	SZA	
0475	00651	102066	HLT ERH	XCR
0476	00652	021413	XCR ALT0	
0477	00653	051413	CPA ALT0	
0478	00654	002001	RSS	
0479	00655	102066	HLT ERH	XCR
0480	00656	021415	XCR ALT1	
0481	00657	051366	CPA M1	
0482	00660	002001	RSS	
0483	00661	102066	HLT ERH	XCR
0484	00662	021413	XCR ALT0	
0485	00663	051415	CPA ALT1	
0486	00664	002001	RSS	
0487	00665	102066	HLT ERH	XCR
0488	00666	021415	XCR ALT1	
0489	00667	002002	SZA	
0490	00670	102066	HLT ERH	XCR
0491	00671	003400	CCA	
0492	00672	021366	XCR M1	
0493	00673	002002	SZA	
0494	00674	102066	HLT ERH	XCR

PAGE 0014 #01 DIAGNOSTIC CONFIGURATOR (DSA 000200)

		PRE-TEST PART A (BP)	
0496*			
0497*			
0498	00675 002400	CLA	
0499	00676 031335	ICR BP	
0500	00677 002002	SZA	
0501	00700 102066	HLT ERH	ICR
0502	00701 031413	ICR ALT0	
0503	00702 051413	CPA ALT0	
0504	00703 002001	RSS	
0505	00704 102066	HLT ERH	ICR
0506	00705 031415	ICR ALT1	
0507	00706 051366	CPA M1	
0508	00707 002001	RSS	
0509	00710 102066	HLT ERH	ICR
0510	00711 002400	CLA	
0511	00712 031415	ICR ALT1	
0512	00713 051415	CPA ALT1	
0513	00714 002001	RSS	
0514	00715 102066	HLT ERH	ICR
0515	00716 031413	ICR ALT0	
0516	00717 051366	CPA M1	
0517	00720 002001	RSS	
0518	00721 102066	HLT ERH	ICR

PAGE 0015 #01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0520*          PRE-TEST PART A (BP)
0521*
0522 00722 002400      CLA
0523 00723 006400      CLB
0524 00724 071376      STA TMPA
0525 00725 051365      L01 CPA H100K
0526 00726 002001      RSS
0527 00727 024734      JMP **5
0528 00730 102201      SCC
0529 00731 002040      SEZ
0530 00732 102066      HLT ERH      E SET / C NOT SET
0531 00733 103101      CLO
0532 00734 102301      SCS
0533 00735 002040      SEZ
0534 00736 102066      HLT ERH      E / C SET
0535 00737 002004      INA
0536 00740 002003      SZB,RSS
0537 00741 024756      JMP NXT01
0538 00742 006004      INB
0539 00743 006003      SZB,RSS
0540 00744 102066      HLT ERH      INA
0541 00745 035376      ISZ TMPA
0542 00746 002001      RSS
0543 00747 102066      HLT ERH      ISZ
0544 00750 051376      CPA TMPA
0545 00751 002001      RSS
0546 00752 102066      HLT ERH      ISZ / INA
0547 00753 054000      CPB A
0548 00754 024725      JMP L01
0549 00755 102066      HLT ERH      ISZ / INB
0550 00756 002040      NXT01 SEZ
0551 00757 102201      SCC
0552 00760 102066      HLT ERH      E NOT SET / C SET
0553 00761 000040      CLE
0554 00762 006004      INB
0555 00763 002040      SEZ
0556 00764 102201      SCC
0557 00765 102066      HLT ERH      E NOT SET / C SET
0558 00766 000040      CLE
0559 00767 006002      SZB
0560 00770 102066      HLT ERH      INB
0561 00771 035376      ISZ TMPA
0562 00772 102066      HLT ERH      ISZ
0563 00773 102301      SCS
0564 00774 002040      SEZ
0565 00775 102066      HLT ERH      E / C SET

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PAGE 0016 #01 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0567*
0566*
0569 00776 002400 CLA
0570 00777 007400 CCB
0571 01000 041336 ADA B1
0572 01001 102301 SCS
0573 01002 002040 SEZ
0574 01003 102066 HLT ERH E / O SET
0575 01004 045336 ADB B1
0001 01005 002040 SEZ
0002 01006 102201 SCC
0003 01007 102066 HLT ERH E NOT SET / O SET
0004 01010 000040 CLE
0005 01011 051336 CPA B1
0006 01012 006002 SZB
0007 01013 102066 HLT ERH ADA/ADE
0008 01014 003400 CCA
0009 01015 006400 CLB
0010 01016 045336 ADB B1
0011 01017 102301 SCS
0012 01020 002040 SEZ
0013 01021 102066 HLT ERH E / O SET
0014 01022 041336 ADA B1
0015 01023 002040 SEZ
0016 01024 102201 SCC
0017 01025 102066 HLT ERH E NOT SET / O SET
0018 01026 000040 CLE
0019 01027 055336 CPB B1
0020 01030 002002 SZA
0021 01031 102066 HLT ERH ADA/ADE
0022 01032 002400 CLA
0023 01033 007400 CCB
0024 01034 041366 ADA M1
0025 01035 102301 SCS
0026 01036 002040 SEZ
0027 01037 102066 HLT ERH E / O SET
0028 01040 045366 ADB M1
0029 01041 002040 SEZ
0030 01042 102201 SCC
0031 01043 102066 HLT ERH E NOT SET / O SET
0032 01044 000040 CLE
0033 01045 051366 CPA M1
0034 01046 002001 RSS
0035 01047 102066 HLT ERH ADA
0036 01050 055367 CPB M2
0037 01051 002001 RSS
0038 01052 102066 HLT ERH ADE
0039 01053 003400 CCA
0040 01054 006400 CLB
0041 01055 045366 ADB M1
0042 01056 102301 SCS
0043 01057 002040 SEZ
0044 01060 102066 HLT ERH E / C SET
0045 01061 041366 ADA M1
0046 01062 002040 SEZ
0047 01063 102201 SCC

```

PAGE 0017 #02 DIAGNOSTIC CONFIGURATOR (CSN 000200)

0048	01064	102066	HLT ERH	E NOT SET / O SET
0049	01065	000040	CLE	
0050	01066	051367	CPA M2	
0051	01067	002001	RSS	
0052	01070	102066	HLT ERH	ADA
0053	01071	055366	CPB M1	
0054	01072	002001	RSS	
0055	01073	102066	HLT ERH	ADB
0056	01074	061413	LDA ALT0	
0057	01075	065415	LCB ALT1	
0058	01076	045415	ADB ALT1	
0059	01077	102201	SOC	
0060	01100	002040	SEZ	
0061	01101	102066	HLT ERH	E SET / C NOT SET
0062	01102	103101	CLO	
0063	01103	041416	ACA ALT1A	
0064	01104	002040	SEZ	
0065	01105	102201	SCC	
0066	01106	102066	HLT ERH	E NOT SET / O SET
0067	01107	000040	CLE	
0068	01110	055413	CPB ALT0	
0069	01111	002002	SZA	
0070	01112	102066	HLT ERH	ACA/ADB
0071	01113	061415	LDA ALT1	
0072	01114	065413	LCB ALT0	
0073	01115	041413	ACA ALT0	
0074	01116	102301	SCS	
0075	01117	002040	SEZ	
0076	01120	102066	HLT ERH	E / O SET
0077	01121	045416	ACB ALT1A	
0078	01122	002040	SEZ	
0079	01123	102201	SCC	
0080	01124	102066	HLT ERH	E NOT SET / O SET
0081	01125	000040	CLE	
0082	01126	051366	CPA M1	
0083	01127	006002	SZE	
0084	01130	102066	HLT ERH	ACA/ADB

PAGE 0018 #02 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0086*                                PRE-TEST PART A (BP)
0087*
0088*      *   CALCULATE MEMORY SIZE & RUN MEMORY ADDRESS AND PATTERN ON
0089*      MEMORY ABOVE 4K-IF MEMORY>4K.
0090*
0091  01131 065363      LDB B10K      START WITH 8K
0092  01132 045340      ACB B3        MOVE TO ADDRESS 3
0093  01133 002400      L02  CLA      CLEAR WRAPAROUND
0094  01134 070003      STA 3B
0095  01135 061413      LDA ALTO      TRY TO
0096  01136 170001      STA B,I       WRITE PATTERN THERE
0097  01137 050003      CPA 3B        DID IT WRAPAROUND
0098  01140 025152      JMP NXT02     YES = NO MEMORY
0099  01141 150001      CPA B,I       DID THE PATTERN STORE?
0100  01142 025147      JMP **5       YES, MEMORY IS THERE
0101  01143 002400      CLA          NO, SHOULD
0102  01144 150001      CPA B,I       BE ALL
0103  01145 025152      JMP NXT02     0'S
0104  01146 102066      HLT ERH      NOT 0, SOMETHING'S WRONG
0105  01147 045363      ACB B10K     MOVE UP 4K
0106  01150 006021      SSB, RSS     DONE 32K?
0107  01151 025133      JMP L02      NO
0108  01152 060001      NXT02 LDA B    CHANGE HANDS
0109  01153 041370      ADA M10K     BACK UP ONE STEP
0110  01154 000040      CLE
0111  01155 103101      CLC
0112  01156 051340      CPA B3        ONLY 4K?
0113  01157 025771      JMP NXT05     YES = SKIP MEMORY TESTS
0114  01160 011364      AND B70K     ELIMINATE LOWER 2 BITS
0115  01161 041361      ACA B7700    POINT TO BINARY LOADER
0116  01162 041366      ACA M1
0117  01163 102601      OTA SWREG     DISPLAY MEMORY SIZE
0118  01164 002040      SEZ
0119  01165 102201      SCC
0120  01166 102066      HLT ERH      E NOT SET / 0 SET
0121  01167 000040      CLE
0122  01170 071403      STA LADD      LWAM
0123  01171 061361      LDA B7700    SET FWAM
0124  01172 071402      STA FADD

```

PAGE 0019 #02 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0126*      *   QUICK MEMORY ADDRESS TEST
0127*
0128 01173 061402      LDA FADD
0129 01174 170000 L03 STA A,I      STORE IN EACH
0130 01175 051403      CPA LADD      LOCATION OF AVAILABLE
0131 01176 025201      JMP **3      MEMORY THE ADDRESS
0132 01177 002004      INA          OF THAT LOCATION
0133 01200 025174      JMP L03
0134 01201 061402      LDA FADD
0135 01202 150000 L04 CPA A,I      VERIFY MEMORY
0136 01203 002001      RSS          CONTENTS
0137 01204 102066      HLT ERH      MEMORY ADDRESS FAILURE
0138 01205 051403      CPA LADD
0139 01206 025211      JMP **3      GO ON TO MEMORY PATTERN TEST
0140 01207 002004      INA
0141 01210 025202      JMP L04
0142*
0143*      *   QUICK MEMORY PATTERN TEST
0144*
0145 01211 003400      CCA          START WITH 177777
0146 01212 065402 L05 LCB FADD
0147 01213 170001 L06 STA B,I      WRITE PATTERN
0148 01214 006004      INB          IN A REG IN
0149 01215 055403      CPB LADD      AVAILABLE MEMRCY
0150 01216 002001      RSS
0151 01217 025213      JMP L06
0152 01220 065402      LCB FADD
0153 01221 150001 L07 CPA B,I      COMPARE PATTERN READ
0154 01222 002001      RSS          TO PATTERN WRITTEN
0155 01223 102066      HLT ERH      MEMORY PATTERN FAILED
0156 01224 006004      INB
0157 01225 055403      CPB LADD
0158 01226 002001      RSS
0159 01227 025221      JMP L07
0160 01230 051415      CPA ALT1     DONE 125252 YET?
0161 01231 025241      JMP NXT03    YES
0162 01232 051413      CPA ALT0
0163 01233 061415      LDA ALT1
0164 01234 002003      SZA,RSS
0165 01235 061413      LDA ALT0
0166 01236 051366      CPA M1
0167 01237 002400      CLA
0168 01240 025212      JMP L05
0169 01241      NXT03 ECL *

```

PAGE 0020 #02 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0171*                                PRE-TEST PART A (BF)
0172*
0173*          WORST CASE PATTERN TEST
0174*
0175  01241 061402          LDA FADD
0176  01242 065402          LCB FADD
0177  01243 071376      L08  STA TMPA
0178  01244 011355          AND B140          WRITE
0179  01245 051355          CPA B140          WCRST
0180  01246 002400          CLA              CASE
0181  01247 002002          SZA              PATTERN
0182  01250 003400          CCA
0183  01251 170001          STA B,I          IN MEMORY
0184  01252 055403          CPB LADD
0185  01253 025260          JMP NXT04
0186  01254 006004          INB
0187  01255 061376          LDA TMPA
0188  01256 002004          INA
0189  01257 025243          JMP L08
0190  01260 061402      NXT04 LDA FADD
0191  01261 065402          LCB FADD
0192  01262 071376      L09  STA TMPA
0193  01263 011355          AND B140          NOW
0194  01264 051355          CPA B140          COMPARE
0195  01265 002400          CLA              PATTERN
0196  01266 002002          SZA
0197  01267 003400          CCA
0198  01270 150001          CPA B,I
0199  01271 002001          RSS
0200  01272 102066          HLT ERH          MEMORY PATTERN FAILED
0201  01273 055403          CPB LADD
0202  01274 025771          JMP NXT05          CONTINUE
0203  01275 061444          LDA MHLT          FILL UNUSED MEMORY
0204  01276 170001          STA B,I          WITH HALTS
0205  01277 006004          INB
0206  01300 061376          LDA TMPA
0207  01301 002004          INA
0208  01302 025262          JMP L09

```


PAGE 0021 #02 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0210*                                PRE-TEST PART A (BP)
0211*
0212*                                PROGRAM COMES HERE FROM CURRENT PAGE
0213*
0214*
0215 01303 125305 BPJP0 JMP **2,I
0216 01304 102066      HLT ERH      JMP (BP),I (TO BP)
0217 01305 001310      DEF **3
0218 01306 102066      HLT ERH      JMP (BP),I (TO BP)
0219 01307 102066      HLT ERH      " "
0220 01310 125312      JMP **2,I
0221 01311 102066      HLT ERH      JMP (BP),I (TO CP)
0222 01312 002037      DEF CPJP0
0223 01313 102066      HLT ERH      JMP (BP),I (TO CP)
0224 01314 102066      HLT ERH      " "
0225 01315 125317 BPJP1 JMP **2,I
0226 01316 102066      HLT ERH      JMP (BP),I (TO CP)
0227 01317 002044      DEF CPJP1
0228 01320 102066      HLT ERH      JMP (BP),I (TO CP)
0229 01321 102066      HLT ERH      " "
0230*
0231 01322 000000 BPJB0 NOP
0232 01323 061322      LDA **1
0233 01324 051436      CPA DJBR2
0234 01325 002001      RSS
0235 01326 102066      HLT ERH      JSB (BP) FROM CP RETURN ADDRESS
0236 01327 060132      LDA HLT0
0237 01330 115332      JSB **2,I
0238 01331 102066 JBRS HLT ERH      JSB (BP),I TO CP
0239 01332 002105      DEF CPJB0
0240 01333 102066      HLT ERH      JSB (BP),I TO CP
0241 01334 102066      HLT ERH      JSB (BP),I TO CP
0242*
0243*                                END OF PRE-TEST PART A (BP)

```

PAGE 0022 #02 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0245*      *   STORAGE AND CONSTANTS
0246*
0247 01335 000000 B0   OCT 0
0248 01336 000001 B1   OCT 1
0249 01337 000002 B2   OCT 2
0250 01340 000003 B3   OCT 3
0251 01341 000004 B4   OCT 4
0252 01342 000005 B5   OCT 5
0253 01343 000006 B6   OCT 6
0254 01344 000007 B7   OCT 7
0255 01345 000010 B10  OCT 10
0256 01346 000017 B17  OCT 17
0257 01347 000037 B37  OCT 37
0258 01350 000040 B40  OCT 40
0259 01351 000054 B54  OCT 54
0260 01352 000060 B60  OCT 60
0261 01353 000070 B70  OCT 70
0262 01354 000077 B77  OCT 77
0263 01355 000140 B140 OCT 140
0264 01356 000170 B170 OCT 170
0265 01357 000177 B177 OCT 177
0266 01360 000777 B777 OCT 777
0267 01361 007700 B7700 OCT 7700
0268 01362 006500 B6.5K OCT 6500
0269 01363 010000 B10K OCT 10000
0270 01364 070000 B70K OCT 70000
0271 01365 100000 B100K OCT 100000
0272 01366 177777 M1   OCT -1
0273 01367 177776 M2   OCT -2
0274 01370 170000 M10K OCT -10000
0275 01371 177760 M17  OCT 177760
0276 01372 177700 M77  OCT 177700
0277 01373 107777 M70K OCT 107777
0278 01374 010003 C0K3 OCT 10003
0279 01375 070003 C32K3 OCT 70003
0280 01376 177777 TMPA OCT -1
0281 01377 000000 TMPB OCT 0
0282 01400 000000 SVA   NCP
0283 01401 000000 SVB   NCP
0284 01402 000000 FADD  NCP
0285 01403 000000 LADD  NCP
0286 01404 000000 DISN  NCP
0287 01405 000000 DI8P  NCP
0288 01406 000000 SWRX  NCP
0289 01407 000000 BIOSC NCP
0290 01410 000000 SCX   NCP
0291 01411 000000 IBUFP NCP
0292 01412 172525 APTRN OCT 172525
0293 01413 125252 ALT0  OCT 125252
0294 01414 125253 ALT0A OCT 125253
0295 01415 052525 ALT1  OCT 052525
0296 01416 052526 ALT1A OCT 052526

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PAGE 0023 #02 DIAGNOSTIC CONFIGURATOR (DSN 002200)

```

0298 01417 002720 CFGI DEF CFRG
0299 01420 004100 CHSC DEF CKSC
0300 01421 004062 ISCR DEF ISC
0301 01422 004024 MDVR DEF MVDVR
0302 01423 004000 CFM DEF CFMEM
0303 01424 004113 MSG DEF MSGR
0304 01425 004150 IBUFD DEF IBUF
0305 01426 004163 CNST DEF CNTS
0306 01427 004261 CNSC DEF CVSC
0307 01430 001376 CTMPA DEF TMPA
0308 01431 001377 CTMPB DEF TMPB
0309 01432 000551 GMTSA DEF GMTS
0310 01433 000620 GMTSA DEF GMTS
0311 01434 000530 CJBR0 DEF JBR0
0312 01435 000540 CJBR1 DEF JBR1
0313 01436 002104 CJBR2 DEF JBR2
0314 01437 006740 CTMC DEF TMC
0315 01440 006734 CTMI DEF TMI
0316 01441 007431 CLOVR DEF LDVR
0317 01442 007327 CCO DEF CANSLO
0318 01443 007404 LPDV DEF LNPTR
0319 01444 106075 MFLT OCT 106075
0320*
0321*
0322 01445 015446 CFMPJ JSB **1
0323 01446 000000 NCP
0324 01447 103100 CLF INTP
0325 01450 107705 CLC 5B,C TURN OFF MEMORY PROTECT
0326 01451 006400 CLB
0327 01452 125446 JMP **4,I RETURN
0328*
0329 01453 101454 CEFT DEF **1,I
0330 01454 000101 OCT 101,102,103,104,106,107
0331 01462 000121 OCT 121,122,123,124,125,127
0332 01470 001437 DEF CTMC
0333 01471 006501 DEF LCMXA
0334 01472 006562 DEF FMTBF
0335 01473 001366 DEF M1
0336*
0337 01474 160000 CMABT OCT 160000

```

PAGE 0028 *02 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0484*          START OF PRE-TEST PART B (CP)
0485*
0486 01771 002400 NXT05 CLA
0487 01772 102601      OTA SWREG      CLEAR S-REG.
0488 01773 102301      SOS
0489 01774 002040      SE2
0490 01775 102066      HLT ERH      E / C SET
0491 01776 060132      LDA HLT0      HALT IF CURRENT PAGE/
0492 01777 064132      LDB HLT0      BASE PAGE DOESN'T WORK
0493 02000 026001      JMP *+1
0494 02001 066764      LDE .ALT1
0495 02002 061413      LDA ALT0
0496 02003 002001      RSS
0497 02004 000001      OCT 1      USED IN CPU TYPE CALCULATION
0498 02005 072771      STA .TMPA
0499 02006 075377      STB TMPB
0500 02007 052763      CPA .ALT0
0501 02010 002001      RSS
0502 02011 102066      HLT ERH      LDA (BP) / CPA (CP)
0503 02012 055415      CPB ALT1
0504 02013 002001      RSS
0505 02014 102066      HLT ERH      LDB (CP) / CPB (BP)
0506 02015 066771      LDB .TMPA
0507 02016 061377      LDA TMPB
0508 02017 052764      CPA .ALT1
0509 02020 002001      RSS
0510 02021 102066      HLT ERH      STB (BP)    CPA (CP)
0511 02022 055413      CPB ALT0
0512 02023 002001      RSS
0513 02024 102066      HLT ERH      STA (CP) / CPB (BP)

```

PAGE 0029 #02 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0515*          PRE-TEST PART B (CP)
0516 02025 026027      JMP **2
0517 02026 102066      HLT ERH      JMP (CF)
0518 02027 026033      JMP **4
0519 02030 102066      HLT ERH      JMP (CF)
0520 02031 026035      JMP **4
0521 02032 102066      HLT ERH      JMP (CF)
0522 02033 026031      JMP **2
0523 02034 102066      HLT ERH      JMP (CF)
0524*
0525 02035 025303      JMP BPJP0
0526 02036 102066      HLT ERH      JMP (CF) TO (BP)
0527 02037 126041      CPJP0 JMP **2,I
0528 02040 102066      HLT ERH      JMP (CF),I (TO BP)
0529 02041 001315      DEF BPJP1
0530 02042 102066      HLT ERH      JMP (CF),I (TO BP)
0531 02043 102066      HLT ERH      " " "
0532 02044 126046      CPJP1 JMP **2,I
0533 02045 102066      HLT ERH      JMP (CF),I (TO CP)
0534 02046 002051      DEF **3
0535 02047 102066      HLT ERH      JMP (CF),I (TO CP)
0536 02050 102066      HLT ERH      " "
0537*
0538 02051 002400      CLA
0539 02052 072062      STA .JB0
0540 02053 072075      STA .JB1
0541 02054 071322      STA BPJB0
0542 02055 072105      STA CPJB0
0543 02056 060132      LDA HLT0
0544 02057 064132      LDB HLT0
0545 02060 016062      JSB **2
0546 02061 102066      JBR3 HLT ERH      JSB (CF)
0547 02062 000000      .JB0 NCP
0548 02063 062062      LDA **1
0549 02064 052773      CPA DJBR3
0550 02065 002001      RSS
0551 02066 102066      HLT ERH      JSB (CF) RETURN ADDRESS
0552 02067 060132      LDA HLT0
0553 02070 116072      JSB **2,I
0554 02071 102066      JBR4 HLT ERH      JSB (CF),I
0555 02072 002075      DEF **3
0556 02073 102066      HLT ERH      JSB (CF),I
0557 02074 102066      HLT ERH      JSB (CF),I
0558 02075 000000      .JB1 NCP
0559 02076 062075      LDA **1
0560 02077 052774      CPA DJBR4
0561 02100 002001      RSS
0562 02101 102066      HLT ERH      JSB (CF),I RETURN ADDRESS
0563 02102 060132      LDA HLT0
0564 02103 015322      JSB BPJB0
0565 02104 102066      JBR2 HLT ERH      JSB (BF)
0566 02105 000000      CPJB0 NCP
0567 02106 062105      LDA **1
0568 02107 052775      CPA DJBR5
0569 02110 002001      RSS
0570 02111 102066      HLT ERH      JSB (BF),I TO CP RETURN ADDRESS

```

PAGE 0030 #02 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0572*          PRE-TEST PART B (CF)
0573*
0574 02112 062765 LDA SRGP1 1000100100100111
0575 02113 066766 LOB SRGP2 1001100000100000
0576 02114 001000 ALS 1001001001001110
0001 02115 005100 BRS 1100110000010000
0002 02116 001100 ARS 1100100100100111
0003 02117 005400 BLR 0001100000100000
0004 02120 001000 ALS 1001001001001110
0005 02121 005700 BLF 1000001000000001
0006 02122 001300 RAR 0100100100100111
0007 02123 005000 BLS 1000010000000010
0008 02124 001100 ARS 0010010010010011
0009 02125 005300 RBR 0100001000000001
0010 02126 001400 ALR 0100100100100110
0011 02127 005000 BLS 0000010000000010
0012 02130 001200 RAL 1001001001001100
0013 02131 005700 BLF 0100000000100000
0014 02132 001100 ARS 1100100100100110
0015 02133 005200 RBL 1000000000100000
0016 02134 001400 ALR 0001001001001100
0017 02135 005100 BRS 1100000000100000
0018 02136 001700 ALF 0010010011000001
0019 02137 005200 RBL 1000000000100000
0020 02140 001200 RAL 0100100110000010
0021 02141 005100 BRS 1100000000100000
0022 02142 001000 ALS 0001001100000100
0023 02143 005300 RBR 0110000000010000
0024 02144 001300 RAR 0000100110000010
0025 02145 005400 BLR 0100000000100000
0026 02146 001700 ALF 1001100000100000
0027 02147 005000 BLS 0000000000100000
0028 02150 052766 CPA SRGP2
0029 02151 002001 RSS
0030 02152 102066 HLT ERH SRG INST A-REG.
0031 02153 056767 CPE SRGP3
0032 02154 002001 RSS
0033 02155 102066 HLT ERH SRG INST B-REG.
0034 02156 102301 SOS
0035 02157 002040 SEZ
0036 02160 102066 HLT ERH E / O SET

```

PAGE 0031 #03 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0038*
0039*
0040 02161 066765 LDB SRGP1 1000100100100111
0041 02162 062766 LDA SRGP2 1001100000100000
0042 02163 005000 BLS 1001001001001110
0043 02164 001100 ARS 1100110000010000
0044 02165 005100 BRS 1100100100100111
0045 02166 001400 ALR 0001100000100000
0046 02167 005000 BLS 1001001001001110
0047 02170 001700 ALF 1000001000000001
0048 02171 005300 RBR 0100100100100111
0049 02172 001000 ALS 1000010000000010
0050 02173 005100 BRS 0010010010010011
0051 02174 001300 RAR 0100001000000001
0052 02175 005400 BLR 0100100100100110
0053 02176 001000 ALS 0000010000000010
0054 02177 005200 RBL 1001001001001100
0055 02200 001700 ALF 0100000000100000
0056 02201 005100 BRS 1100100100100110
0057 02202 001200 RAL 1000000001000000
0058 02203 005400 BLR 0001001001001100
0059 02204 001100 ARS 1100000000100000
0060 02205 005700 BLF 0010010011000001
0061 02206 001200 RAL 1000000001000001
0062 02207 005200 RBL 0100100110000010
0063 02210 001100 ARS 1100000000100000
0064 02211 005000 BLS 0001001100000100
0065 02212 001300 RAR 0110000000010000
0066 02213 005300 RBR 0000100110000010
0067 02214 001400 ALR 0100000000100000
0068 02215 005700 BLF 1001100000100000
0069 02216 001000 ALS 0000000001000000
0070 02217 066766 CPB SRGP2
0071 02220 002001 WSS
0072 02221 102066 HLT ERH SRG INST B-REG.
0073 02222 052767 CPA SRGP3
0074 02223 002001 WSS
0075 02224 102066 HLT ERH SRG INST A-REG.
0076 02225 102301 SCS
0077 02226 002040 SEZ
0078 02227 102066 HLT ERH E / C SET

```

PAGE 0032 #03 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0080*          PRE-TEST PART B (CP)
0081*
0082 02230 062765 LDA SRGP1 1000100100100111
0083 02231 066766 LCB SRGP2 1001100000100000
0084 02232 000020 OCT 0020 ALS 1001001001001110
0085 02233 004021 OCT 4021 BRS 1100110000010000
0086 02234 000021 OCT 0021 ARS 1100100100100111
0087 02235 004024 OCT 4024 BLR 0001100000100000
0088 02236 000020 OCT 0020 ALS 1001001001001110
0089 02237 004027 OCT 4027 BLF 1000001000000001
0090 02240 000023 OCT 0023 RAR 0100100100100111
0091 02241 004020 OCT 4020 BLS 1000010000000010
0092 02242 000021 OCT 0021 ARS 0010010010010011
0093 02243 004023 OCT 4023 RBR 0100001000000001
0094 02244 000024 OCT 0024 ALR 0100100100100110
0095 02245 004020 OCT 4020 BLS 0000010000000010
0096 02246 000022 OCT 0022 RAL 1001001001001100
0097 02247 004027 OCT 4027 BLF 0100000000100000
0098 02250 000021 OCT 0021 ARS 1100100100100110
0099 02251 004022 OCT 4022 RBL 1000000001000000
0100 02252 000024 OCT 0024 ALR 0001001001001100
0101 02253 004021 OCT 4021 BRS 1100000000100000
0102 02254 000027 OCT 0027 ALF 0010010011000001
0103 02255 004022 OCT 4022 RBL 1000000001000001
0104 02256 000022 OCT 0022 RAL 0100100110000010
0105 02257 004021 OCT 4021 BRS 1100000000100000
0106 02260 000020 OCT 0020 ALS 0001001100000100
0107 02261 004023 OCT 4023 RBR 0110000000010000
0108 02262 000023 OCT 0023 RAR 0000100110000010
0109 02263 004024 OCT 4024 BLR 0100000000100000
0110 02264 000027 OCT 0027 ALF 1001100000100000
0111 02265 004020 OCT 4020 BLS 0000000001000000
0112 02266 052766 CPA SRGP2
0113 02267 002001 RSS
0114 02270 102066 HLT ERH SRG INST A-REG.
0115 02271 056767 CPE SRGP3
0116 02272 002001 RSS
0117 02273 102066 HLT ERH SRG INST B-REG.
0118 02274 102301 SCS
0119 02275 002040 SEZ
0120 02276 102066 HLT ERH E / C SET

```


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```

0122*
0123*
0124 02277 066765 LDB SRGP1 1000100100100111
0125 02300 062766 LCA SRGP2 1001100000100000
0126 02301 004020 OCT 4020 BLS 1001001001001110 1100110000010000
0127 02302 000021 OCT 0021 ARS 1100110000010000
0128 02303 004021 OCT 4021 BRS 1100100100100111
0129 02304 000024 OCT 0024 ALR 0001100000100000
0130 02305 004020 OCT 4020 BLS 1001001001001110
0131 02306 000027 OCT 0027 ALF 1000001000000001
0132 02307 004023 OCT 4023 RBR 0100100100100111
0133 02310 000020 OCT 0020 ALS 1000010000000010
0134 02311 004021 OCT 4021 BRS 0010010010010011
0135 02312 000023 OCT 0023 RAR 0100001000000001
0136 02313 004024 OCT 4024 BLR 0100100100100110
0137 02314 000020 OCT 0020 ALS 0000010000000010
0138 02315 004022 OCT 4022 RBL 1001001001001100
0139 02316 000027 OCT 0027 ALF 0100000000100000
0140 02317 004021 OCT 4021 BRS 1100100100100110
0141 02320 000022 OCT 0022 RAL 1000000001000000
0142 02321 004024 OCT 4024 BLR 0001001001001100
0143 02322 000021 OCT 0021 ARS 1100000000100000
0144 02323 004027 OCT 4027 BLF 0010010011000001
0145 02324 000022 OCT 0022 RAL 1000000001000001
0146 02325 004022 OCT 4022 RBL 0100100110000010
0147 02326 000021 OCT 0021 ARS 1100000000100000
0148 02327 004020 OCT 4020 BLS 0001001100000100
0149 02330 000023 OCT 0023 RAR 0110000000010000
0150 02331 004023 OCT 4023 RBR 0000100110000010
0151 02332 000024 OCT 0024 ALR 0100000000100000
0152 02333 004027 OCT 4027 BLF 1001100000100000
0153 02334 000020 OCT 0020 ALS 0000000001000000
0154 02335 066766 CPB SRGP2
0155 02336 002001 RSS
0156 02337 102066 HLT ERH SRG INST B=REG.
0157 02340 052767 CPA SRGP3
0158 02341 002001 RSS
0159 02342 102066 HLT ERH SRG INST A=REG.
0160 02343 102301 SCS
0161 02344 002040 SEZ
0162 02345 102066 HLT ERH E / O SET

```

PAGE 0034 #03 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0164*
0165*
0166 02346 002770 LDA SRGEP 0111010001110010
0167 02347 006770 LDB SRGEP 0111010001110010
0168 02350 001500 ERA 0011101000111001 0
0169 02351 005600 ELB 0 1110100011100100
0170 02352 001500 ERA 0001110100011100 1
0171 02353 005600 ELB 1 1101000111001001
0172 02354 001500 ERA 1000111010001110 0
0173 02355 005600 ELB 1 1010001110010010
0174 02356 001500 ERA 1100011101000111 0
0175 02357 005600 ELB 1 0100011100100100
0176 02360 001500 ERA 1110001110100011 1
0177 02361 005600 ELB 0 1000111001001001
0178 02362 001500 ERA 0111000111010001 1
0179 02363 005600 ELB 1 0001110010010011
0180 02364 001500 ERA 1011100011101000 1
0181 02365 005600 ELB 0 0011100100100111
0182 02366 001500 ERA 0101110001110100 0
0183 02367 005600 ELB 0 0111001001001110
0184 02370 005500 ERB 0 0011100100100111
0185 02371 001600 ELA 1011100011101000 0
0186 02372 005500 ERB 1 0001110010010011
0187 02373 001600 ELA 0111000111010001 1
0188 02374 005500 ERB 1 1000111001001001
0189 02375 001600 ELA 1110001110100011 0
0190 02376 005500 ERB 1 0100011100100100
0191 02377 001600 ELA 1100011101000111 1
0192 02400 005500 ERB 0 1010001110010010
0193 02401 001600 ELA 1000111010001110 1
0194 02402 005500 ERB 0 1101000111001001
0195 02403 001600 ELA 0001110100011100 1
0196 02404 005500 ERB 1 1110100011100100
0197 02405 001600 ELA 0011101000111001 0
0198 02406 005500 ERB 0 0111010001110010
0199 02407 001600 ELA 0111010001110010 0
0200 02410 002770 CPA SRGEP
0201 02411 002001 RSS
0202 02412 102066 HLT ERH SRG E-REG ERROR
0203 02413 006770 CPB SRGEP
0204 02414 002001 RSS
0205 02415 102066 HLT ERH SRG E-REG ERROR
0206 02416 102301 SDS
0207 02417 002040 SEZ
0208 02420 102066 HLT ERH E / C SET

```

PAGE 0035 #03 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0210*
0211*
0212 02421 062770 LDA SRGEP 0111010001110010
0213 02422 066770 LCB SRGEP 0111010001110010
0214 02423 000025 OCT 0025 ERA 0011101000111001 0
0215 02424 004026 OCT 4026 ELB 0 1110100011100100
0216 02425 000025 OCT 0025 ERA 0001110100011100 1
0217 02426 004026 OCT 4026 ELB 1 1101000111001001
0218 02427 000025 OCT 0025 ERA 1000111010001110 0
0219 02430 004026 OCT 4026 ELB 1 1010001110010010
0220 02431 000025 OCT 0025 ERA 1100011101000111 0
0221 02432 004026 OCT 4026 ELB 1 0100011100100100
0222 02433 000025 OCT 0025 ERA 1110001110100011 1
0223 02434 004026 OCT 4026 ELB 0 1000111001001001
0224 02435 000025 OCT 0025 ERA 0111000111010001 1
0225 02436 004026 OCT 4026 ELB 1 0001110010010011
0226 02437 000025 OCT 0025 ERA 1011100011101000 1
0227 02440 004026 OCT 4026 ELB 0 0011100100100111
0228 02441 000025 OCT 0025 ERA 0101110001110100 0
0229 02442 004026 OCT 4026 ELB 0 0111001001001110
0230 02443 004025 OCT 4025 ERB 0 0011100100100111
0231 02444 000026 OCT 0026 ELA 1011100011101000 0
0232 02445 004025 OCT 4025 ERB 1 0001110010010011
0233 02446 000026 OCT 0026 ELA 0111000111010001 1
0234 02447 004025 OCT 4025 ERB 1 1000111001001001
0235 02450 000026 OCT 0026 ELA 1110001110100011 0
0236 02451 004025 OCT 4025 ERB 1 0100011100100100
0237 02452 000026 OCT 0026 ELA 1100011101000111 1
0238 02453 004025 OCT 4025 ERB 0 1010001110010010
0239 02454 000026 OCT 0026 ELA 1000111010001110 1
0240 02455 004025 OCT 4025 ERB 0 1101000111001001
0241 02456 000026 OCT 0026 ELA 0001110100011100 1
0242 02457 004025 OCT 4025 ERB 1 1110100011100100
0243 02460 000026 OCT 0026 ELA 0011101000111001 0
0244 02461 004025 OCT 4025 ERB 0 0111010001110010
0245 02462 000026 OCT 0026 ELA 0111010001110010 0
0246 02463 052770 CPA SRGEP
0247 02464 002001 RSS
0248 02465 102066 HLT ERH SRG E=REG ERROR
0249 02466 056770 CPB SRGEP
0250 02467 002001 RSS
0251 02470 102066 HLT ERH SRG E=REG ERROR
0252 02471 102301 SCS
0253 02472 002040 SEZ
0254 02473 102066 HLT ERH E / C SET

```

PAGE 0036 #03 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0256*          PRE-TEST PART B (CP)
0257*
0258*          BASIC I/O TEST
0259*
0260 02474      BIOT EQL *
0261 02474 061406 LDA SWRX
0262 02475 011354 AND B77
0263 02476 071407 STA BICSC      SAVE I7
0264 02477 002003 SZA,RSS      IS THERE ONE?
0265 02500 026702 JMP BICEX      NO SKIP BASIC I/O
0266 02501 011353 AND B70      CHECK OVER 7B
0267 02502 002003 SZA,RSS
0268 02503 102066 HLT ERH
0269 02504 067001 BIC0 LDE BIOSD      UPDATE I/O INSTRUCTIONS
0270 02505 160001 LDA B,I
0271 02506 051366 CPA M1      END OF LIST
0272 02507 026515 JMP BIC1      YES - START EXECUTION
0273 02510 011372 AND M77      MASK CLO SC CFF
0274 02511 031407 IOR BICSC      ADD NEW SC
0275 02512 170001 STA B,I      PUT IT BACK IN PLACE
0276 02513 006004 INB          MOVE TO NEXT INSTRUCTION
0277 02514 026505 JMP BIC0+1
0278 02515 065340 BIC1 LDE B3      SET TRAP CELLS
0279 02516 063000 LDA IHLT      TO INTERRUPT HALT
0280 02517 170001 STA B,I
0281 02520 055354 CPB B77      END
0282 02521 026524 JMP **3      YES
0283 02522 006004 INB
0284 02523 026517 JMP **4
0285 02524 107700 CLC INTP,C      GENERATE CRS TO ALL I/O

```

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```

0287*          PRE-TEST PART B (CP)
0288*
0289*          BASIC I/O TEST
0290*
0291 02525 102100      STF INTP      TOGGLE INTERRUPT
0292 02526 103100      CLF INTP      FLAG TO CLEAR
0293 02527 102200      SFC INTP      IS IT CLEARED?
0294 02530 102066      HLT ERH       NO - ERROR
0295 02531 102300      SFS INTP      IS IT NOT SET
0296 02532 002001      RSS
0297 02533 102066      HLT ERH       NO - ERROR
0298 02534 102100      STF INTP      SET INTERRUPT FLAG
0299 02535 102300      SFS INTP      IS IT SET?
0300 02536 102066      HLT ERH       NO - ERROR
0301 02537 102200      SFC INTP      IS IT NOT CLEARED?
0302 02540 002001      RSS
0303 02541 102066      HLT ERH       NO - ERROR
0304 02542 103100      CLF INTP      TURN FLAG OFF
0305 02543 102100      BS01 STF SC     TOGGLE INTERFACE
0306 02544 103100      BS02 CLF SC     CARD FLAG TO CLEAR
0307 02545 102200      BS03 SFC SC     IS IT CLEARED?
0308 02546 102066      HLT ERH       NO - ERROR
0309 02547 102300      BS04 SFS SC     IS IT NOT SET?
0310 02550 002001      RSS
0311 02551 102066      HLT ERH       NO - ERROR
0312 02552 102100      BS05 STF SC     SET CARD FLAG
0313 02553 102300      BS06 SFS SC     IS IT SET
0314 02554 102066      HLT ERH       NO - ERROR
0315 02555 102200      BS07 SFC SC     IS IT NOT CLEAR?
0316 02556 002001      RSS
0317 02557 102066      HLT ERH       NO - ERROR
0318 02560 016751      JSB BIC1      SET INTERRUPT RETURN
0319 02561 002571      DEF BICR1     INTERRUPT TO ERROR
0320 02562 102100      BS08 STF SC     SET THE FLAG
0321 02563 102700      BS09 STC SC     AND CONTROL
0322 02564 102100      STF INTP      TURN I/O SYSTEM ON THEN
0323 02565 103100      CLF INTP      TURN I/O SYSTEM OFF
0324 02566 000000      NCP           GIVE IT A CHANCE TO INTERRUPT
0325 02567 000000      NCP
0326 02570 026573      JMP **3
0327 02571 000000      BICR1 NCP
0328 02572 102066      HLT ERH       INTERRUPT CANT BE TURNED OFF
0329 02573 107700      CLC INTP,C    GENERATE CRS

```

PAGE 0038 #03 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0331*                                     PRE-TEST PART B (CP)
0332*
0333*                                     BASIC I/O TEST
0334*
0335 02574 107700 BS10 CLC SC,C      RESET SC FLAG AND CONTROL
0336 02575 065345      LDB B10      START WITH LOWEST ADDRESS
0337 02576 055407 BS10 CPB B10SC    IS IT THIS SELECT CODE
0338 02577 026607      JMP B103     YES - SKIP CHECK
0339 02600 062776      LDA .STF     SET UP
0340 02601 030001      ICR B        INSTRUCTIONS
0341 02602 072604      STA **2
0342 02603 103100 BS11 CLF SC        CLEAR SC FLAG
0343 02604 000000      NCP
0344 02605 102200 BS12 SFC SC        CHECK SC FLAG
0345 02606 102066      HLT ERH      NOT CLEAR THEN ERROR
0346 02607 055354 BS10 CPB B77     IS THAT THE LAST?
0347 02610 026613      JMP **3     YES - MOVE TO NEXT TEST
0348 02611 006004      INE          NO - MOVE TO NEXT SC
0349 02612 026576      JMP B102     AND CHECK IT
0350 02613 107700      CLC INTP,C   CREATE CRS IN CASE OF PRIV. INT.
0351 02614 016751      JSB B10I     SET INTERRUPT LINK
0352 02615 002726      DEF B10I0
0353 02616 002400      CLA          CLEAR FLAGS
0354 02617 072635      STA B10JD
0355 02620 072726      STA B10I0
0356 02621 071376      STA TMPA
0357 02622 102700 BS13 STC SC        TURN ON
0358 02623 102100 BS14 STF SC        CARD
0359 02624 102100      STF INTP     AND INTF'S
0360 02625 102701      STC 1        *
0361 02626 102101      STF 1        *
0362 02627 106701      CLC 1        *
0363 02630 103101      CLF 1        * NO INTERRUPT
0364 02631 126632      JMP **1,I    * SHOULD OCCUR
0365 02632 002633      DEF **1      * HERE
0366 02633 116634      JSB **1,I    *
0367 02634 002635      DEF **1      *
0368 02635 000000 BS10JD NCF        *
0369 02636 035376      ISZ TMPA     INT. SHOULD BE HERE
0370 02637 035376      ISZ TMPA
0371 02640 103100      CLF INTP
0372 02641 107700 BS15 CLC SC,C     TURN I/O SYSTEM OFF
0373 02642 066726      LDB B10I0    RESET SC FLAG AND CONTROL
0374 02643 006003      SZB,RSS      DID IT INTERRUPT?
0375 02644 102066      HLT ERH      NO - ERROR
0376 02645 065376      LDB TMPA     RETURN CORRECTLY
0377 02646 055337      CPB B2
0378 02647 002001      RSS
0379 02650 102066      HLT ERH      NO - ERROR

```

PAGE 0039 #03 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0381*          PRE-TEST PART B (CF)
0382*
0383*          BASIC I/O TEST
0384*
0385 02651 016751      JSB BICI
0386 02652 002663      DEF BICR2
0387 02653 102700      BS16 STC SC          CONTROL CN
0388 02654 102100      BS17 STF SC          FLAG LP
0389 02655 102100      STF INTP          TURN CN INTERRUPTS
0390 02656 106700      BS20 CLC SC          CLEAR SC CONTROL
0391 02657 000000      NCF                GIVE IT A CHANCE
0392 02658 000000      NCF                *
0393 02661 000000      NCF                *
0394 02662 026665      JMP **3
0395 02663 000000      BIOR2 NCF
0396 02664 102066      HLT ERH          CONTROL NOT CLEARED
0397 02665 103100      CLF INTP          TURN INTP'S OFF
0398 02666 016751      JSB BICI
0399 02667 002677      DEF BICR3
0400 02670 102700      BS21 STC SC          TURN CONTROL CN
0401 02671 102100      STF INTP          TURN INTP'S ON
0402 02672 106700      CLC INTP          CLEAR I/O SYSTEM
0403 02673 000000      NCF                GIVE IT A CHANCE
0404 02674 000000      NCF                *
0405 02675 000000      NCF                *
0406 02676 026701      JMP **3
0407 02677 000000      BIOR3 NCF
0408 02700 102066      HLT ERH
0409 02701 107700      BS22 CLC SC,C      TURN OFF DEVICE
0410 02702 107700      BIOEX CLC INTP,C   TURN OFF ALL I/O
0411 02703 061406      LDA SWRX          CHECK IF AUTOMATIC MODE
0412 02704 011361      AND B7700
0413 02705 002002      SZA
0414 02706 027030      JMP CFGR          YES GO TO CONFIGURATION
0415 02707 061406      LDA SWRX          CHECK IF LOOP
0416 02710 011363      AND B10K
0417 02711 002002      SZA
0418 02712 024140      JMP PTLF          YES LOOP
0419 02713 061406      LDA SWRX          RESTORE S-REG.
0420 02714 102601      OTA SWREG
0421 02715 061404      LDA DISN          AND A & B REG
0422 02716 065405      LDB DIBP
0423 02717 102077      HLT 77B          WAIT FOR CONFIGURATION INFORMATION
0424*
0425 02720 107700      CFRG CLC INTP,C    TURN OFF ALL I/O
0426 02721 071404      STA DISN
0427 02722 075405      STB DIBP
0428 02723 102501      LIA SWREG          GET SWITCH REGISTER
0429 02724 071406      STA SWRX
0430 02725 027030      JMP CFGR          GO TO CONFIGURATION

```

PAGE 0040 #03 DIAGNOSTIC CONFIGURATOR (DSN 000200)

```

0432*          PRE-TEST PART B (CP)
0433*
0434*          BASIC I/O TEST
0435*
0436 02726 000000 BIOC0 NOP
0437 02727 103100 CLF INTF          TURN I/O SYSTEM OFF
0438 02730 066635 LDB BIOC0 CHECK TO SE IF ALL
0439 02731 056747 CPB BIOC0 INSTRUCTIONS COMPLETED
0440 02732 002001 RSS
0441 02733 102066 HLT ERH          NO - ERROR
0442 02734 066750 LDB BIOC0 CHECK RETURN ADDRESS
0443 02735 056726 CPB BIOC0 *
0444 02736 026741 JMP **3 *
0445 02737 006004 INB *
0446 02740 056726 CPB BIOC0 *
0447 02741 002001 RSS *
0448 02742 102066 HLT ERH *
0449 02743 016751 JSB BICI SET ERROR IF SECOND INTF
0450 02744 002760 DEF BICE
0451 02745 102100 STF INTF          TURN I/O SYSTEM ON
0452 02746 126726 JMP BIOC0,I CONTINUE TEST
0453*
0454 02747 002634 BIOD0 DEF BIOC0-1
0455 02750 002636 BIOD1 DEF BIOC0+1
0456*
0457*
0458 02751 000000 BIOC1 NOP
0459 02752 166751 LCB BICI,I
0460 02753 036751 ISZ BICI
0461 02754 074003 STB SB
0462 02755 066777 LDB JSBI.
0463 02756 074000 BSSTB STB SC
0464 02757 126751 JMP BICI,I
0465*
0466*
0467 02760 000000 BIOC2 NOP
0468 02761 102066 HLT ERH          SECOND INTERRUPT OCCURED
0469 02762 126760 JMP BICE,I
0470*

```


PAGE 0041 #03 DIAGNOSTIC CONFIGURATOR (CSN 000200)

```

0472 02763 125252 .ALT0 OCT 125252
0473 02764 052525 .ALT1 OCT 052525
0474 02765 104447 SRGP1 OCT 104447 1000100100100111
0475 02766 114040 SRGP2 OCT 114040 1001100000100000
0476 02767 000100 SRGP3 OCT 000100
0477 02770 072162 SRGEP OCT 072162 011010001110010
0478 02771 000000 .TMPA NCF
0479 02772 000000 .TMPB NCF
0480 02773 002061 CJBR3 DEF JBR3
0481 02774 002071 CJBR4 DEF JBR4
0482 02775 001331 CJBR5 DEF JBR5
0483 02776 102100 .STF STF 0
0484 02777 114003 JSBI. JSB 3B,I
0485 03000 106077 IMLT OCT 106077
0486*
0487*
0488 03001 103002 BIOSD DEF *+1,I
0489 03002 002543 DEF BS01
0490 03003 002544 DEF BS02
0491 03004 002545 DEF BS03
0492 03005 002547 DEF BS04
0493 03006 002552 DEF BS05
0494 03007 002553 DEF BS06
0495 03010 002555 DEF BS07
0496 03011 002562 DEF BS08
0497 03012 002563 DEF BS09
0498 03013 002574 DEF BS10
0499 03014 002603 DEF BS11
0500 03015 002605 DEF BS12
0501 03016 002622 DEF BS13
0502 03017 002623 DEF BS14
0503 03020 002641 DEF BS15
0504 03021 002653 DEF BS16
0505 03022 002654 DEF BS17
0506 03023 002656 DEF BS20
0507 03024 002670 DEF BS21
0508 03025 002701 DEF BS22
0509 03026 002756 DEF BSSTB
0510 03027 001366 DEF M1

```

BASIC BINARY LOADER LISTINGS

APPENDIX

E

E-1. GENERAL

With the availability of the Configurator and diagnostics on different media and the 2100A/S, 2114A/B, 2115A, and 2116A/B/C computers not having appropriate absolute binary ROM loaders, it will be necessary to toggle the corresponding loader into the last 64 locations of any one page in the available base memory, excluding pages 0, 1, or 2. (The configurator will load into any memory location from 2 to 7677.)

Table E-1 summarizes the four loaders listed in tables E-2 through E-5. Table E-1 also specifies the peripheral product and corresponding interface, subsystem, and loader format.

Table E-1. Basic Binary Loader Reference

LOADER LISTING	ASSOCIATED DEVICE			FORMAT
	PERIPHERAL PRODUCT	INTERFACE	SUBSYSTEM NUMBER	
Table E-2	7900 Cartridge Disc	13210A Disc Interface	12960A	Disc Boot
	7901 Cartridge Disc	13210A Disc Interface	12961A	Disc Boot
Table E-3	7905/20 Cartridge Disc	13175A or 13178B Disc Interface	12962A/B/C/D (For 7905 Only)	Disc Boot
Table E-4	2644/45 CRT Terminal	12966A Buffered Async Interface or 12968A Async Interface	N/A	Absolute Binary
Table E-5	7970B Mag Tape	13181A Mag Tape Interface	12970A	Absolute Binary
	7970E Mag Tape	13183A Mag Tape Interface	12972A	Absolute Binary

E-2. 7900/7901 DISC LOADER

This disc loader loads a program from an HP 7900 or 7901 into memory. Starting at the beginning of cylinder 0, it is used to load from the selected surface of disc drive 0 a block of 128 (decimal) words into memory starting at location 2011 (octal). It then jumps indirect to a subroutine via memory address 2055 (octal) to execute the program just loaded from the disc. This program can be a boot loader which loads the Configurator after RUN is pressed. If the load is not successful, the result is unpredictable and the disc loader may have to be reloaded if a second load execution is desired. Before execution, the S-register must be set to 10 (octal). Table E-2 lists the loading and execution procedure.

E-3. 7905/7920 DISC LOADER

This disc loader loads a program from an HP 7905 or an HP 7920 into memory. Starting at the beginning of cylinder 0, it is used to load from the selected surface of disc drive 0 a block of 128

words into memory starting at location 2011 (octal). It then jumps indirect to a subroutine via memory address 2055 (octal) to execute the program just loaded from the disc. This program can be a boot loader which loads the Configurator after RUN is pressed. If the load is not successful, the result is unpredictable and the disc loader may have to be reloaded if a second load execution is desired. Before execution, the S-register must be set to 10 (octal). Table E-3 lists the loading and execution procedure.

E-4. 2644/45 CARTRIDGE TAPE LOADER

This loader is used to load the Configurator stored on an HP 2644/45 cartridge tape via an HP 12966A Buffered Asynchronous Interface or an HP 12968A Asynchronous Interface into memory. The operator must select via the console the unit and file number prior to starting the loader. (Refer to *HP 2644A Mini Data Station Owner's Manual*, part no. 02644-90001, or to the *HP 2645A Display Station User's Manual*, part no. 02645-90001.) There are no S-register settings required. Table E-4 lists the loading and execution procedure.

E-5. 7970B/7970E MAGNETIC TAPE LOADER

This loader is used to load the Configurator from 9-track magnetic tape (unit 0 only) into memory. Due to the fact that this loader does not have file selection capabilities, it is the responsibility of the operator to ensure that the next file to be read is the Configurator. There are no S-register settings required. Table E-5 lists the loading and execution procedure.

Table E-2. HP 7900/7901 Disc Boot Loader

```

0001          ASMB,A,B,L,C
0003 07700          ORG 7700B
0004*
0005*
0006*** 7900 DISC BOOT LOADER ***
0007*
0008*
0009*      LOAD THE ENTIRE PROGRAM INTO THE LAST 64 LOCATION OF
0010*      ANY ONE PAGE IN BASE MEMORY WITH THE CORRECT SC'S FOR
0011*      THE DATA (DC) AND CONTROL (CC) CHANNELS. BRING THE
0012*      P-REGISTER TO THE STARTING ADDRESS OF THE PROGRAM,
0013*      SET S-REGISTER TO 10 (OCTAL), PRESS PRESET (INT.
0014*      AND EXT.) AND RUN.
0015*
0016*
0017*      SEEK CYLINDER 0, UPPER/LOWER PLATTER, SECTOR 0
0018*
0019 07700 067741  START LDB SEEKC      GET SEEK COMMAND WORD
0020 07701 106600          OTB DC      ←  USE WORD FOR ADDRESS 0
0021 07702 103700          STC DC,C    ←  AND OUTPUT TO DATA CHANNEL
0022 07703 106601          OTB CC      ←  OUTPUT SEEK COMMAND
0023 07704 103701          STC CC,C    ←  AND START SEEK
0024 07705 102300          SFS DC      ←  HAS CYLINDER ADDRESS BEEN ACCEPTED?
0025 07706 027705          JMP *-1      NO
0026 07707 002400          CLA          SPECIFY HEAD 0 AND SECTOR 0
0027 07710 102600          OTA DC      ←  AND OUTPUT TO DATA CHANNEL
0028 07711 103700          STC DC,C    ←
0029 07712 102301          SFS CC      ←  IS SEEK OPERATION COMPLETED?
0030 07713 027712          JMP *-1      NO
0031*
0032*      DMA INITIALIZATION
0033*
0034 07714 067735          LDB DMACW    GET DMA CONTROL WORD
0035 07715 106606          OTB 6        ISSUE DMA CONTROL WORD
0036 07716 067736          LDB ADDR1    GET MEMORY ADDR AND SPECIFY INPUT
0037 07717 106602          OTB 2        ISSUE MEMORY ADDR
0038 07720 102702          STC 2        SELECT WORD COUNT
0039 07721 067740          LDB CNT      GET WORD COUNT
0040 07722 106602          OTB 2        ISSUE WORD COUNT
0041*
0042*      7900 READ ROUTINE
0043*
0044 07723 106700          CLC DC      ←  PREPARE CONTROLLER FOR READ COMMAND
0045 07724 106701          CLC CC      ←
0046 07725 063742          LDA READC    GET READ COMMAND WORD
0047 07726 103601          OTA CC,C    ←  AND OUTPUT COMMAND
0048 07727 103700          STC DC,C    ←  PREPARE DATA CHANNEL FOR READ OPERATION
0049 07730 103706          STC 6,C      START DMA TRANSFER
0050 07731 103701          STC CC,C    ←  INITIATE READ OPERATION
0051 07732 102301          SFS CC      ←  CHECK FOR TRANSFER FINISHED
0052 07733 027732          JMP *-1
0053 07734 117737  EXIT JSB ADDR2,I    EXIT TO BOOT LOADER
0054*
0055*      CONSTANTS
0056*
0057 07735 120000  DMACW ABS 120000B+DC-SC OF CHANNEL (BITS 15 & 13 SET)
0058 07736 102011  ADDR1 OCT 102011
0059 07737 102055  ADDR2 OCT 102055
0060 07740 177600  CNT  DEC -128
0061 07741 030000  SEEKC OCT 030000    SEEK COMMAND WORD
0062 07742 020000  READC OCT 020000    READ COMMAND WORD
0063*
0064 00000          DC  EQU 0B
0065 00001          CC  EQU DC+1
0066          END
** NO ERRORS *TOTAL **RTE ASMB 750420**

```

Table E-3. HP 7905/20 Disc Boot Loader

```

0001          ASMB,A,B,L,C
0003 07700          ORG 7700B
0004*
0005*
0006**** 7905 DISC BOOT LOADER ****
0007*
0008*
0009*      LOAD THE ENTIRE PROGRAM INTO THE LAST 64 LOCATION OF
0010*      ANY ONE PAGE IN BASE MEMORY WITH THE CORRECT SC FOR
0011*      THE DISC CHANNEL. BRING THE P-REGISTER TO THE STAR-
0012*      TING ADDRESS OF THE PROGRAM, SET S-REGISTER TO 10
0013*      (OCTAL), PRESS PRESET (INT. AND EXT.) AND RUN.
0014*
0015*
0016*      DMA INITIALIZATION
0017*
0018 07700 067716  START LDB DMACW      GET DMA CONTROL WORD
0019 07701 106606          OTB 6        ISSUE DMA CONTROL WORD
0020 07702 067717          LDB ADDR1     GET MEMORY ADDR AND SPECIFY INPUT
0021 07703 106602          OTB 2        ISSUE MEMORY ADDR
0022 07704 102702          STC 2        SELECT WORD COUNT
0023 07705 067721          LDB CNT      GET WORD COUNT
0024 07706 106602          OTB 2        ISSUE WORD COUNT
0025*
0026*      7905 COLD LOAD ROUTINE
0027*
0028 07707 106700          CLC SC      ← PREPARE CONTROLLER FOR COMMAND
0029 07710 002400          CLA          CREATE COLD LOAD READ, HEAD 0, SECTOR 0
0030 07711 103600          OTA SC,C ← OUTPUT COLD LOAD COMMAND
0031 07712 103706          STC 6,C     START DMA TRANSFER
0032 07713 102300          SFS SC      ← CHECK FOR TRANSFER FINISHED
0033 07714 027713          JMP *-1
0034 07715 117720  EXIT  JSB ADDR2,I  EXIT TO BOOT LOADER
0035*
0036*      CONSTANTS
0037*
0038 07716 000000  DMACW ABS SC      ← SC OF CHANNEL (BITS 15 & 13 CLEARED)
0039 07717 102011  ADDR1 OCT 102011
0040 07720 102055  ADDR2 OCT 102055
0041 07721 177600  CNT  DEC -128
0042*
0043 00000          SC  EQU 0B
0044          END
** NO ERRORS *TOTAL **RTE ASMB 750420**

```

Table E-4. HP 2644/45 Cartridge Tape Binary Loader

```

0001                      ASMB,A,B,L
0003 07700                ORG 7700B
0004*
0005*
0006*** 2644/45 CARTRIDGE TAPE ABSOLUTE BINARY LOADER
0007*
0008*
0009*    LOAD THE ENTIRE PROGRAM INTO THE LAST 64 LOCATION OF
0010*    ANY ONE PAGE IN BASE MEMORY WITH THE CORRECT SC FOR
0011*    THE CHANNEL. BRING THE P-REGISTER TO THE STARTING
0012*    ADDRESS OF THE PROGRAM, PRESS PRESET (INT. AND EXT.)
0013*    AND RUN.
0014*    THIS ASSUMES THE INTERFACE IS A 12966 OR 12968
0015*    THE BAUD RATE IS EXTERNAL
0016*    THE CARTRIDGE IS POSITIONED AT THE FILE TO BE READ
0017*    "RUN" CAN NOT BE PRESSED AFTER HALT 77B OR HALT 11B
0018*
0019*
0020 07700 063773  START LDA LDOTP      RESET POINTER
0021 07701 073702          STA *+1
0022 07702 063763  NCW  LDA OTP          GET A WORD FROM THE TABLE
0023 07703 037702          ISZ *-1      MOVE TO NEXT WORD IN TABLE
0024 07704 103600          OTA SC,C ←    OUTPUT CURRENT WORD
0025 07705 053771          CPA EOT      END OF TABLE?
0026 07706 027717          JMP NRD      YES - START INPUT
0027 07707 001727          ALF,ALF      IS THIS A CHARACTER?
0028 07710 013772          AND .377
0029 07711 002002          SZA          ?
0030 07712 027702          JMP NCW      NO - DO NEXT CONTROL WORD
0031 07713 103700          STC SC,C ←    PUT CARD IN DATA MODE
0032 07714 102300          SFS SC ←     IS CHARACTER OUT?
0033 07715 027714          JMP *-1      NO - WAIT FOR IT
0034 07716 027702          JMP NCW      YES - DO NEXT CONTROL WORD
0035 07717 017750  NRD  JSB INPUT      READ IN FIRST WORD (RECORD COUNT)
0036 07720 005727          BLF,BLF      POSITION COUNT TO LOWER BYTE
0037 07721 007007          CMB,INB,SZB,RSS MAKE IT NEG AND IS IT EOF?
0038 07722 102077          HLT 77B      YES - END-OF-FILE
0039 07723 006021          SSB,RSS      IF COUNT WAS ALL ONES
0040 07724 102000          HLT 0        THEN TAPE ERROR
0041 07725 077776          STB WCT      SAVE COUNT
0042 07726 017750          JSB INPUT      READ STORE ADDRESS
0043 07727 077774          STB CKSUM     START CHECKSUM
0044 07730 077775          STB ADD       AND SAVE ADDRESS
0045 07731 017750  NWD  JSB INPUT      GET WORD TO BE STORED
0046 07732 063775          LDA ADD      CHECK IF ADDRESS
0047 07733 043777          ADA MXAD     IS ABOVE LOADER
0048 07734 002040          SEZ          IS IT?
0049 07735 102055          HLT 55B      YES
0050 07736 177775          STB ADD,I     NO - PUT WORD IN MEMORY
0051 07737 047774          ADB CKSUM     ADD IT TO CHECKSUM
0052 07740 077774          STB CKSUM
0053 07741 037775          ISZ ADD       MOVE ADDRESS UP ONE
0054 07742 037776          ISZ WCT      FINISHED WITH THIS RECORD?
0055 07743 027731          JMP NWD      NO - READ NEXT WORD
0057 07744 017750          JSB INPUT      YES - READ CHECKSUM
0058 07745 057774          CPB CKSUM     IS CHECKSUM OK?
0059 07746 027717          JMP NRD      YES - READ NEXT RECORD
0060 07747 102011          HLT 11B      NO
0061 07750 000000  INPUT NOP           INPUT ONE WORD FROM INTERFACE
0062 07751 006700          CLB,CCE      ZERO WORD AND START WITH UPPER HALF
0063 07752 102500          LIA SC ←     GET DATA
0064 07753 002021          SSA,RSS      IS IT VALID DATA?
0065 07754 027752          JMP *-2      NO
0066 07755 013772          AND .377     YES - ELIMINATE UPPER HALF
0067 07756 044000          ADB A        ADD DATA TO B REG.
0068 07757 002041          SEZ,RSS      SECOND HALF READ?
0069 07760 127750          JMP INPUT,I  YES - RETURN WITH WORD IN B REG.

```

Table E-4. HP 2644/45 Cartridge Tape Binary Loader (Continued)

```

0070 07761 005767      BLF,CLE,BLF  NO - MOVE BYTE TO UPPER HALF
0071 07762 027752      JMP INPUT+2  SET LOWER HALF FLAG AND READ IT
0072*
0073 07763 150077  OTP    OCT 150077  MASTER RESET
0074 07764 040740      OCT 40740    INTERFACE CONTROL
0075 07765 030003      OCT 30003    CHAR FRAME CONTROL
0076 07766 000033  CHR1  OCT 33      ASCII "ESC"
0077 07767 050077      OCT 50077    RESET BUFFER STATUS
0078 07770 000145  CHR2  OCT 145     ASCII LOWER CASE "E"
0079 07771 040340  EOT   OCT 40340   INPUT COMMAND WORD
0080*
0081 07772 000377  .377  OCT 377     UPPER HALF WORD MASK
0082 07773 063763  LDOTP LDA OTP     POINTER TO OUTPUT TABLE
0083 07774 000000  CKSUM NOP         CHECKSUM STORAGE
0084 07775 000000  ADD  NOP         ADDRESS STORAGE
0085 07776 000000  WCT  NOP         INPUT WORD COUNT
0086 07777 170100  MXAD ABS -START   START BINARY LOADER AREA
0087*
0088 00000      SC    EQU 0B
0089 00000      A    EQU 0B
0090 00001      B    EQU 1B
0091          END
** NO ERRORS *TOTAL **RTE ASMB 750420**

```

Table E-5. HP 7970B/7970E Magnetic Tape Binary Loader

```

0001          ASMB,A,B,L      MAG TAPE LOADER
0003  07700          ORG 7700B
0004*
0005*
0006****  7970 MAG TAPE ABSOLUTE BINARY LOADER
0007*
0008*
0009*          LOAD THE ENTIRE PROGRAM INTO THE LAST 64 LOCATION OF
0010*          ANY ONE PAGE IN BASE MEMORY WITH THE CORRECT SC'S FOR
0011*          THE DATA (DC) AND CONTROL (CC) CHANNELS. BRING THE
0012*          P-REGISTER TO THE STARTING ADDRESS OF THE PROGRAM.
0013*          PRESS PRESET (INT. AND EXT.) AND RUN.
0014*
0015*
0016  07700  067753  START  LDB RDCMD      GET READ COMMAND
0017  07701  106601          OTB CC      ←  OUTPUT COMMAND
0018  07702  102501          LIA CC      ←  CHECK IF REJECTED
0019  07703  001323          RAR,RAR
0020  07704  001310          RAR,SLA      ??
0021  07705  027701          JMP *-4      YES, TRY AGAIN
0022  07706  103701          STC CC,C    ←  NO, START COMMAND
0023  07707  103700          STC DC,C    ←  START DATA CHANNEL
0024  07710  102201  WFST  SFC CC      ←  CHECK FOR STATUS
0025  07711  027743          JMP STAT    YES
0026  07712  102300          SFS DC      ←  ANY DATA
0027  07713  027710          JMP *-3      NO
0028  07714  107500          LIB DC,C    ←  YES GET IT (RECORD COUNT)
0029  07715  005727          BLF,BLF     POSITION COUNT TO LOWER BYTE
0030  07716  007000          CMB          MAKE IT NEGATIVE
0031  07717  077755          STB WCT      SAVE INPUT COUNT
0032  07720  102201          SFC CC      ←  CHECK FOR STATUS
0033  07721  027743          JMP STAT    YES EXIT TO STATUS
0034  07722  102300          SFS DC      ←  WAIT TO READ NEXT WORD
0035  07723  027720          JMP *-3
0036  07724  107500          LIB DC,C    ←  GET LOAD ADDRESS
0037  07725  074000          STB 0        START CHECKSUM
0038  07726  077756          STB CMD      AND ADDRESS POINTER
0039  07727  027733          JMP *+4
0040  07730  177756  NWD  STB CMD,I      PUT WORD IN MEMORY
0041  07731  040001          ADA 1        ADD IT TO CHECK SUM
0042  07732  037756          ISZ CMD      MOVE UP ADDRESS
0043  07733  102300          SFS DC      ←  WAIT FOR NEXT WORD
0044  07734  027733          JMP *-1
0045  07735  107500          LIB DC,C    ←  GET DATA TO STORE IN MEMORY
0046  07736  037755          ISZ WCT      FINISHED WITH DATA?
0047  07737  027730          JMP NWD     NO READ NEXT WORD
0048  07740  054000          CPB 0        IS CHECKSUM OK?
0049  07741  027710          JMP WFST    YES - WAIT FOR COMMAND CHANNEL STATUS
0050  07742  102011          HLT 11B     NO
0052  07743  102501  STAT  LIA CC      ←  GET STATUS
0053  07744  001727          ALF,ALF     POSITION EOF BIT
0054  07745  002020          SSA          IS IT EOF?
0055  07746  102077          HLT 77B     YES
0056  07747  001727          ALF,ALF     REPOSITION STATUS
0057  07750  001310          RAR,SLA     YES READ OK?
0058  07751  102000          HLT 0       NO TELL OPERATOR
0059  07752  027700          JMP START   YES READ NEXT RECORD
0060*
0061*
0062  07753  001423  RDCMD  OCT 1423     MT READ A RECORD COMMAND
0063  07754  000203  FFC    OCT 203      MT FILE FORWARD COMMAND
0064  07755  000000  WCT    NOP          INPUT WORD COUNT
0065  07756  000000  CMD    NOP
0066*
0067  00000          DC      EQU 0B
0068  00001          CC      EQU DC+1
0069          END
**  NO ERRORS *TOTAL **RTE ASMB 750420**

```